



APPENDICES

Final

Environmental Impact Statement for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base, Guam

Department of the Air Force

April 2025



PRIVACY ADVISORY

This Final Environmental Impact Statement (EIS) was provided for public comment in accordance with the National Environmental Policy Act (NEPA) and Environmental Impact Analysis Process (EIAP) (32 CFR Part 989). The EIAP provides an opportunity for public input on United States Department of the Air Force (DAF) decision making, allows the public to offer input on alternative ways for DAF to accomplish what it is proposing, and solicits comments on DAF's analysis of environmental effects.

Public input allows the DAF to make better-informed decisions. Letters or other written or verbal comments provided may be published in this EIS. Providing personal information is voluntary. Private addresses were compiled to develop a stakeholders inventory. However, only the names of the individuals making comments and their specific comments will be disclosed. Personal information, home addresses, telephone numbers, and email addresses are not published in this EIS.

Section 508 of the Rehabilitation Act of 1973

The digital version of this EIS and its project website are compliant with Section 508 of the Rehabilitation Act of 1973 because assistive technology (e.g., "screen readers") can be used to help the disabled understand these electronic media. Due to the nature of graphics, figures, tables, and images occurring in this document, accessibility may be limited to a descriptive title for each item.

NEPA Compliance

The DAF is aware that the President of the United States has issued Executive Order (EO) 14154, Unleashing American Energy, which revoked EO 11991, which amended EO 11514. Council on Environmental Quality has provided notice that it intends to rescind the Council on Environmental Quality NEPA regulations.

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APPENDICES

Appendix A: Draft EIS Public Comments



ENVIRONMENTAL IMPACT STATEMENT for
F-15 BEDDOWN and INFRASTRUCTURE UPGRADES
at ANDERSEN AIR FORCE BASE, GUAM

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Appendix A: Public Comments

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Appendix A: Public Comments

A Notice of Availability for the Draft Environmental Impact Statement (EIS) was published on June 14, 2024 starting a 45 day public review and comment period (Vol 89, No. 116, Federal Register, 50586, June 14, 2024). Comments received during the 45 day public review period and the Department of the Air Force's responses to comments are included in this appendix.

A-1. Draft EIS Public Review Period

A-1.1 Comments Received During Public Review Period

The Draft EIS public review period occurred from June 14, 2024 through July 29, 2024. Comments were accepted through August 2, 2024. During the Draft EIS public review period, a total of 55 comment correspondences from 46 commenters were received. A correspondence may contain one or more separate comments. Two comment correspondences were received verbally at the public meetings, 43 comment correspondences were received via email, and 10 comment correspondences were received through the website. Seven commenters submitted their comment correspondence two times. Identical submissions from the same commenter were counted as one comment correspondence. In addition, one commenter submitted revisions to a previously submitted comment correspondence, which was counted as one comment correspondence. Without counting identical comment correspondences from the same commenter or revisions, a total of 47 comment correspondences were received during the Draft EIS public review period.

All correspondences submitted during the Draft EIS public review period were reviewed and broken down into their individual comments, presented below. During the review of comments, it was determined that 17 comment correspondences contained duplicate content (i.e., a form letter submitted by multiple commenters). Each of these correspondences was given equal weight; however, the content of the correspondence is included in this appendix only once. In total, 30 unique comment correspondences were received during the scoping period.

A-1.1.1 Public Comments and Responses

Table A-1 Error! Reference source not found. provides the Draft EIS public comments received during the Draft EIS public review period and comment responses.

Table A-1. Comments Received During Draft EIS Public Review Period

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Cassie	N/A	001a	Biological Resources	I am strongly opposed to the construction or infrastructure upgrades that will cause the disturbance of 200 plus acres of limestone forests and potential cultural related artifacts and burials. In a climate of global warming, we need to be planting more trees, not tearing existing ones down.	<p>Conservation measures to offset impacts from the Proposed Action have been developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures that are included in the Biological Opinion include development of a 151 acre habitat enhancement area where special status plant species will be replanted in a 151 acre protected zone on Andersen AFB. The conservation measures are detailed in the Biological Opinion, which is included in EIS Appendix B.</p> <p>Weather Stressor impacts are discussed in Section 3.11.1.4 and 3.11.2.1. While a total of approximately 192 acres would be disturbed, 96 acres would be revegetated and the remaining 96 acres would be permanently disturbed. Discussion of impacts on biological resources, including limestone forests, and cultural resources from the Proposed Action is included in Section 3.4.2 and 3.5.2, respectively, of the EIS.</p>

Public	Amador Antolin	N/A	002a	Noise/Mitigation	<p>My name, Amador Antolin, and I live in Yigo area, and my major concern is the noise of the airplane. And as of now, it happens that it's so noisy. And probably if there's another airplane, then it's going to be more noisy. So, is there any way that they could minimize or compensate my area or my house to minimize the noise? Or do I have to spend money to reduce the -- reduce the noise for my protection and the noise? Or is there other ways that we could minimize the noise, things like that? So, there's another concern, is about my health due to the noise, like my hearing aid, my hearing, it's really affects due to the noise of the airplane.</p> <p>One more question. How do I know if there's something like any compensation or anything they could remedy the noise in the area? That's it.</p>	<p>The DAF primary noise reduction strategy is implementing flight protocols and practices, and the tracking of noise complaints and resolution. The primary protocol to reduce noise at the base is to execute the majority of take-off and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and summarized in Section 3.10.4 of the EIS, and would be the standard practice for the proposed F-15s. Architectural upgrades and other noise reduction elements have not been carried forward as an additional mitigation measure in the Final EIS or ROD.</p>
Public	Cynthia Blas	N/A/	003a	Noise/Mitigation	<p>My name is Cynthia Blas. I am a resident of Yigo. I happen to live two minutes,</p>	<p>The DAF primary noise reduction strategy is implementing flight</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>three minutes, outside the back gate of Andersen by car; and when the operations go with this touch-and-go during training exercises, the noise level is unbearable. It is so unbearable that we can't talk, we can't watch TV, and most importantly, we can't really sleep well.</p> <p>So, here's the thing that I am looking for and I am hoping it can be accommodated, is that I understand, one, the flightpath cannot be changed; and one of the flightpath flies directly over my home when the pilots on -- use the right side runway and they're going to descend to land, they actually come into my area right above my home.</p> <p>And so, because it can't be changes, I'm looking for mitigation for soundproofing my home. And if that can be done, oh, my gosh, my whole neighborhood would be very happy and I'm sure we would support this whole project. Okay? Thank you.</p>	<p>protocols and practices, and the tracking of noise complaints and resolution. The primary protocol to reduce noise at the base is to execute the majority of take-off and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and summarized in Section 3.10.4 of the EIS, and would be the standard practice for the proposed F-15s. Architectural upgrades and other noise reduction elements have not been carried forward as an additional mitigation measure in the Final EIS or ROD.</p>
Public	Michael Gawel	N/A	004a	Unsubstantive	<p>Please provide me copies of the Biological Survey Reports, and the Biological Assessment prepared pursuant to Section 7 of the Endangered Species Act (16 United States Code 1536[c]) in support of the Environmental Impact Statement (EIS) for the AAFB Guam F-15 Fighter Jets proposed projects. These are not included in the DEIS. If a draft of the 2024 INRMP review and update is available please also provide it. You may attach a link to these documents in my email or mail hard copies to: [redacted]</p>	<p>Natural resource survey reports were provided via email by David Martin, AFCEC CIE, on July 23, 2024. The Biological Assessment was not provided because it was under review by U.S. Fish and Wildlife Service at the time of the request.</p>

Federal Agency	Janet Whitlock	US Department of the Interior	005a	Biological Resources	<p>On July 5, 2024, the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, received the action agency's request for formal consultation to address effects to five threatened plant species (<i>Bulbophyllum guamense</i>, <i>Cycas micronesica</i>, <i>Dendrobium guamense</i>, <i>Tabernaemontana rotensis</i>, and <i>Tuberolabium guamense</i>) and the threatened Mariana fruit bat (<i>Pteropus mariannus mariannus</i>) pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The DEIS references the formal consultation but does not describe the conservation measures that will be taken to minimize and offset project impacts to listed species as part of the section 7 consultation. The Department recommends that the Air Force include these measures in the description and analysis of the agency action in the Final EIS.</p> <p>The Department also recommends that the Air Force specify in the Final EIS the invasive species interdiction, detection, rapid response, and eradication commitments that will be implemented to ensure project aircraft, support vehicles, and shipments in support of the aircraft do not introduce new invasive species to Guam or spread existing invasive species from Guam to other islands. We recognize there is already a robust Joint Region Marianas program operating under the Brown Treesnake and Biosecurity Management Strategy for Training Activities within Guam & Commonwealth of the Northern Mariana Islands; however, we anticipate this program will need to expand in order to address the increased risk of spread of invasives associated with the proposed action.</p>	<p>The conservation measures in the Biological Opinion and agreed to by DAF are included Appendix B of the EIS, and will be included in the Record of Decision. The conservation measures in the Biological Opinion that was issued by U.S. Fish and Wildlife Service are binding and would be, therefore, non-discretionary. Under the Proposed Action, DAF does not anticipate the need to expand the biosecurity program already in place. Aircraft would be permanently bed down and would not transit to and from other Pacific islands after the beddown. Other support materials or aircraft arriving at or departing Guam under the Proposed Action would fall within the normal operations that already occur at Andersen AFB.</p> <p>As part of the Proposed Action, incoming materials and aircraft will be inspected as part of the JRM biosecurity program and will be subject to the Brown Treesnake and Biosecurity Management Strategy for Training Activities within Guam & Commonwealth of the Northern Mariana Islands. This program is currently scaled to respond to inspection needs for all training events and can accommodate the one-time event for the addition of up to 12 aircraft, and following beddown, aircraft and cargo will not have movements to off-island destinations during day-to-day operations. However, the fighter aircraft support equipment and cargo as well as household goods and personal vehicle shipments departing Guam, will</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
						require the program to scale up. Additional information has been added to Section 3.4.2.

Public	Michael Gawel	N/A	006a	Noise	<p>Please consider these personal comments being submitted from an environmental planner who has been a Guam resident since 1973.</p> <p>My family and I have lived in Y-Papao Estates Guam since 1991. My wife and I are retired and always at home, day and night, because she suffers from dementia. Our house is designed with large windows which let air circulate while keeping out rain. We very rarely use our air conditioners. But the noise of planes from Andersen Air Force Base (AAFB) interferes with our listening to conservations, radio and TV. We are very concerned that the increased noise from the F-15 fighter planes and increased AAFB exercises will make our life more uncomfortable and even drive down the value of our house and property. It will force us to close our windows to lessen the airplane sounds and use air conditioning which will increase our GPA electric power costs. The addition of two proposed training exercises per year at 4 weeks each will severely increase noise pollution caused by AAFB activities. Each training event would include an additional 12 F-15s for a total of 24 F-15s per training event. This equates to 2 months out of the year that our neighborhood will be impacted by this disturbing noise.</p> <p>The EIS should better document ambient noise conditions in our normally quiet neighborhood distinguishing day and night conditions and how much these will change during the exercises. Explain in layman's terms how, for example, increase in noise of ten decibels would be the same as doubling the loudness. Just saying that compatible land uses are beyond the 65 decibel contour does not tell us what the changes in noise will be at our house. A 3 decibel increase in noise is</p>	<p>The comment is consistent with Section 3.10 of the EIS.</p> <p>Background noise both with and without aircraft operations, as well as sound levels for the existing individual aircraft is provided in Section 3.10.1.4 of the EIS. Table 3-28 provides a direct comparison of individual overflights of existing aircraft to the proposed F-15s, which are comparable to other aircraft that routinely operate at the base. As outlined in Section 3.10.2.1, there would be a 30 percent increase in the number of acoustic events that would interfere with speech and a 22 percent increase in the number of events between 10:00 p.m. and 7:00 a.m.</p> <p>The change in sound levels were included in Section 3.10.2.1 of the EIS as before-and-after DNL contours on the same figure, and sound levels from individual aircraft overflights both with and without the Proposed Action. The interpretations relating to a 3 and 10 dBA change in level are not applicable to the DNL sound metric and were not included.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					characterized as “a large change” in the level of noise exposure when the existing condition is below 65 dB. This increase can be perceived by impacted people as a degradation of our noise environment.	
Duplicate	Michael Gawel	N/A	006b	Noise	Will protocols or practices that can reduce off-base noise during the jet flights be suggested and their impacts assessed in the noise model and presented in the Final EIS? How can this be required in the EIS? Can mitigation include use of such protocols?	The primary protocol to reduce noise at the base is, and will continue to be, is to execute the majority of take-off and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and summarized in Section 3.10.4 of the EIS, and will be the standard practice for the proposed F-15s.
Duplicate	Michael Gawel	N/A	006c	Noise	Why won't the annoyance levels obtained from FAA's Neighborhood Environmental Survey not be included in the Final EIS? How can this inclusion be required?	The DAF and other federal agencies, including the FAA, use the FICON dose-response curve (i.e., the modified Shultz Curve) and the 65 dBA DNL metric to assess the effects of noise for land use planning purposes; therefore, annoyance levels obtained from FAA's Neighborhood Environmental Survey were not included in the EIS. Notably, the Shultz Curve is based on metadata from many studies combined; whereas the FAA study is a standalone study that is in contradiction to decades of study and precedent. It requires additional verification and proof of repeatability before its widespread use is adopted.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Michael Gawel	N/A	006d	Noise/Mitigation	I ask that the EIS should propose mitigations for these noise impacts that would include paying for replacing our windows with sound- insulating windows at our house and added installment of photovoltaic power facilities on our roof to counter increased power costs for air conditioning.	The DAF primary noise reduction strategy is implementing flight protocols and practices, and the tracking of noise complaints and resolution. The primary protocol to reduce noise at the base is to execute the majority of take-off and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and summarized in Section 3.10.4 of the EIS, and would be the standard practice for the proposed F-15s. Architectural upgrades and other noise reduction elements have not been carried forward as an additional mitigation measure in the Final EIS or ROD.
Duplicate	Michael Gawel	N/A	006e	Socioeconomics	Besides the 240 personnel at the installation, an additional approximately 200 personnel would be required for the four weeks twice a year. But no new housing would be built on Andersen AFB as part of the Proposed Action. Personnel and dependents would utilize off base housing within the local community. We are already suffering a housing crisis on Guam because residents are being outpriced by military households for affordable housing. Military construction contracts have driven up new housing costs and have used up island off-base construction resources and raised materials prices. New housing on base must be provided for this need.	The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Michael Gawel	N/A	006f	Biological Resources	Section 3.4.1.4.2 Wildlife does not mention the hilitai, the native Guam monitor lizard <i>Varanus tsukamotoi</i> , which occurs in the impact area.	The 2022 Joint Region Marianas Integrated Natural Resources Management Plan notes the monitor lizard (<i>Varanus indicus</i>) is a naturalized species vice native species due to lack of information about whether the lizard is native or was introduced by early settlers. The monitor lizard was not recorded during project specific natural resources surveys, however this species has been historically documented on the installation and has been added to Section 3.4.1.4.2.
Duplicate	Michael Gawel	N/A	006g	Biological Resources	The coconut crab <i>Birgus latro</i> is mentioned. It is an important species culturally and for consumption. This should be noted in the EIS. It's harvesting on Guam military bases is prohibited, which could be considered a form of mitigation if this prohibition is formalized.	Additional information on the coconut crab (<i>Birgus latro</i>) has been added to Section 3.4.1.4.2. Andersen AFB does not currently issue Coconut Crab Collecting Permits, and will not until issue permits until impacts to this species have been determined.
Duplicate	Michael Gawel	N/A	006h	Biological Resources	The traditional and cultural importance of fruit bats to CHamoro should be recognized and noted. Station 67 appears to be the only current larger scale roosting site for fruit bats on Guam and it is located precariously near the F-15 project site. The project thus could greatly impact the population of this species and lead to its extinction on Guam.	Additional information on the Mariana fruit bat (<i>Pteropus mariannus mariannus</i>) has been added to Section 3.4.1.4.3. DAF engaged in Section 7 consultation with the USFWS to implement conservation measures to offset impacts to the Mariana fruit bat, and the Biological Opinion has been appended to the Final EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Michael Gawel	N/A	006i	Biological Resources	The 2019 INRMP for DoD on Guam is referred but it is required to be revised in 2024. This five year plan revision will be different from 2019 and must be applied to management of resources in the Final EIS. If DoD stalls this and the updated INRMP is not completed and approved, its draft should be considered for input to this EIS and appropriate mitigations to impacts included.	The JRM INRMP was updated in 2022 and the EIS has been updated in sections 3.4.1.1, 3.4.1.2, 3.4.1.4, 3.4.1.4.1, 3.4.1.4.2, and 3.4.1.4.3.
Duplicate	Michael Gawel	N/A	006j	Biological Resources	Will the Final EIS incorporate the January 10, 2024, DRAFT or the FINAL U.S. Fish and Wildlife Service Recommended Measures to Minimize Potential Project Impacts to Threatened and Endangered Species and Critical Habitats in the Mariana Islands ?	No, the Final EIS does not incorporate the January 10, 2024, Draft U.S. Fish and Wildlife Service Recommended Measures to Minimize Potential Project Impacts to Threatened and Endangered Species and Critical Habitats in the Mariana Islands. The biological assessment and the associated Biological Opinion include conservation measures tailored to the proposed action. The Biological Opinion has been appended to the Final EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Michael Gawel	N/A	007a	Biological Resources	<p>Many on-going and planned developments on Guam by the Department of Defense are removing native limestone forest areas and other habitats for native species. Representatives of DoD at the Guam Public Information meeting on this DEIS of July 17, 2024 said that to mitigate the loss of forest areas due to this project, a nursery will be established to grow appropriate native plants and plant the seedlings at a place among the coconut groves below the cliffs at AAFB. The success of this proposed planting into a location that is environmentally different from the area of forest removal on the karst habitat above the cliffs. Besides trying that risky simple but expensive mitigation, additional funding should be provided for researching and developing biocontrols on invasive pests such as the scale that is killing the ESA listed native cycads. Such control should be possible and will have a greater impact on conserving forests on all DoD properties as well as off-base.</p> <p>Are such goals for biocontrols incorporated in the 2024 Draft INRMP for Guam? And does it have an objective of getting the biocontrols for <i>Cycas micronesica</i>?</p>	<p>The Joint Region Marianas Integrated Natural Resources Management Plan was updated in 2022. Sections 4.4.2.5 and 6.3.1.2 of the plan discuss biocontrols that have been funded or are planned.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	008a	Socioeconomics	1. Housing. DEIS Assumptions. The DEIS states that it “is assumed that all personnel would reside in off-installation housing on Guam” (EIS at p. 2-3). The DEIS use of US Census Bureau (USCB) data to project available houses in the local housing market is not likely to be an accurate indicator of houses available in 2029 given (a) the peculiarities of data collection during COVID-19, (b) the almost decade separation between the USCB collection and the housing need that is assumed, and (c) the status of “available houses” in view of US military requirements for occupancy, units in legal probate, and other legal and transactional issues (foreclosure, settlement, renovation).	The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available information on housing availability and affordability from the Joint Region Marianas 2024 Housing Requirements Market Analysis.
Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	008b	Proposed Action	Demand and Displacement Assumptions. It is unclear how many Republic of Singapore Air Force (RSAF) personnel (number accompanied?) and US Department of the Air Force (DAF) personnel (35 accompanied?) are included in the proposed action. The number of 440 (Table 2-4) is assumed, but in discussions with designated representatives during the public meeting in Yigo we found that there was confusion about the source, number, and daily presence of personnel that would be attendant to this action.	Personnel and dependent estimations were reviewed and confirmed. As noted in Section 2.1.1.2, the F-15 beddown would include approximately 205 permanent F-15 personnel with 35 total dependents. During periodic training events, an additional approximately 200 unaccompanied personnel would be required. The mix of DAF and partner nation support personnel was unknown at the time of the analysis. The 205 F-15 personnel and 35 dependents (240 total personnel and dependents) would be permanently located on Guam. The additional 200 temporary support personnel would be on Guam during each four-week training event, which would occur twice per year.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	008c	Socioeconomics	<p>Notwithstanding the final headcount of personnel and dependents, any assumption that all personnel would reside in off-installation housing on Guam fails to account for the socio-economic disruption that is caused by the U.S. military not providing adequate housing for personnel assigned to Guam. This is both an issue of supply and the price effect of the application of the Overseas Housing Allowance (OHA) program that is available to U.S. military personnel assigned to Guam.</p> <p>(a) By way of example. The average household income in Guam (2020 Census) was just less than \$60,000, yielding a 30% allocation for housing of \$1,500 per month. An E-4 military personnel is eligible to almost \$4,000 per month for housing and related allowances under the OHA program. Given the cumulative impact of an assumption that the personnel associated with this proposed action would live off-base, a more thorough analysis of military personnel on the Guam housing market (and its effect on local resident displacement) needs to be conducted in the EIS.nts, any assumption that all personnel would reside in off-installation housing on Guam fails to account for the socio-economic disruption that is caused by the U.S. military not providing adequate housing for personnel assigned to Guam. This is both an issue of supply and the price effect of the application of the Overseas Housing Allowance (OHA) program that is available to U.S. military personnel assigned to Guam.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability.</p>

Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	008d	Socioeconomics	<p>(b) Cumulative Impact. The U.S. military does not appear to have a regular publicly available source of information tracking housing requirements and personnel use of off-base housing and housing allowances. However, it is widely acknowledged (U.S. National Defense Authorization Act FY2024, recent DoD Requests for Information) that there is an acute shortage of housing for military personnel in Guam and that there is an impact on the off-base housing market. Specific to housing at AAFB, data from the FY24 and FY 25 U.S. Navy Military Construction Justification Book budget submissions indicates that after adding 281 accompanied units at AAFB by 2029 (at a cost of just over \$400 million), the unmet on-base housing requirement will be over 1,750 units. This unmet requirement, together with the number of units required under this Proposed Action will have a cumulative impact that must be accounted for in the EIS.</p> <p>Naval Support Activity and Camp Blaz Personnel at AAFB FY22-FY28</p> <p>Fiscal Year Population Effective Requirement DoD Housing Total Not Met Not met (% of requirement)</p> <p>FY 2022 2,681 1,444 729 715 49.5%</p> <p>FY 2023 2,795 1,336 699 637 47.7%</p> <p>FY 2027 (est) 7,848 2,479 852 1,617 65.2%</p> <p>FY 2028 (est) 7,492 2,351 852 1,756 74.7%</p> <p>Source: DoD J Book Budget Submissions FY24 and FY25</p> <p>Note: "Total Not Met" includes "under contract," "Private," and "Deficit."</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information and incorporate information from additional studies such as the Joint Region Marianas 2024 Housing Requirements Market Analysis to better characterize the current state of the local housing market. Additional information was considered in the cumulative impacts analysis.</p>
Local Agency	Leland Bettis	Pacific Center for Island	008e	Socioeconomics	(c) Foreign Labor. The EIS does not account for the effect on the local housing	The housing issues on Guam, including contractor housing issues,

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
		Security (PCIS)			<p>market of foreign labor that will be involved in the construction. In not addressing what is usually contractor provided housing, the EIS overlooks a socio-economic impact on the local housing market. "Barracks" for foreign labor that once characterized the provision of foreign labor housing in Guam have given way to use of apartments (and even repurposed former hotel facilities). The use of local housing market facilities by foreign labor creates additional stress on the limited housing supply in Guam and need to be included in the cumulative impact measurements definitized in this EIS.</p>	<p>are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include more information on contractor housing practices and potential impacts.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	008f	Socioeconomics	<p>(d) New Home Construction. The Guam civilian housing market needs new home construction. The Guam Housing and Urban Renewal Authority's (GHURA) 2020 Housing Assessment estimated that 9,000 new units were needed to address rising housing insecurity in the community. New housing construction at magnitude is not occurring and not likely to occur in view of the current heightened level of military construction. Guam's local construction workforce (5,000 individuals) is largely engaged in on-base activities, and the civilian market's access to foreign labor that the military uses is not legally available. Under these conditions, as the GHURA has noted, "It's not the time for us to try to build anything....Then with the military buildup, so it's very complicating and the demand is much greater than the supply, and it's been like that for several years." (GDP, 13 April 2024). The factors weighing against new home construction in the Guam market are directly related to on-going and future military construction projects and must be considered part of the cumulative impact of any proposed federal action regarding housing requirements.</p> <p>Unless a final EIS can address the issues related to the direct and cumulative substantial impacts related to the housing requirements of the Proposed Action, including the socioeconomic, sociocultural impacts and causal damage to environmental justice communities in the off-base community, all housing requirements anticipated in the DEIS should be provided by new construction of on-base units.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was reviewed and revised to incorporate the most recent available housing information. Additional information was considered in the cumulative impacts analysis.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	008g	Socioeconomics	<p>2. Headline Economic Impact Assumptions</p> <p>We have not conducted a bottom-up review of the economic assumptions presented in the DEIS. However, the significantly incorrect presentation of the headline economic impact from the Proposed Action raises concerns about the materiality of correctness throughout the economic assumptions.</p> <p>DEIS Assumptions. At Table 3-18 (Summary of Estimated Economic Impacts on Jobs, Income, and GIP), the DEIS presents economic impacts from local and foreign labor.</p> <ul style="list-style-type: none"> •The assumption that foreign labor would comprise 70% of the labor requirement over five years appears to be an arbitrary (guesstimate) determination. Moreover, the DEIS fails to address the housing requirement for this imported labor that is assumed to be necessary. •Even with the assumed dependency on foreign labor, the assumed local labor force participation in the project is material or over 25% of the local construction labor pool. The impact of this drawdown and displacement from local construction needs to be addressed. 	<p>The jobs and workforce analysis in Sections 3.6.1 and 3.6.2 of the EIS was reviewed for clarity and updated to include the most recent available information, including additional information on contractor housing. The precise mix of local and foreign construction labor was unknown at the time of the analysis; therefore, an assumption of 70 percent foreign and 30 percent local construction workforce was used.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response															
Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	008h	Soceioeconomics	<p>•As shown in the table below, which averages the DEIS provided total labor force and GIP by job creation, the impact of foreign labor on labor force income and GIP are equal to or greater than the economic impact of the local labor force. The averages indicate that the headline economic impact data in the DEIS is fundamentally flawed, since a defining characteristic of foreign labor income flows is income repatriation to the source country. If the higher average foreign labor impact on GIP arises from an assumption of housing rental, the DEIS fails to account for the related housing displacement in the local community. Whatever the assumptions, the projection of an equal (or higher) impact from foreign labor is logically incorrect. Such an obvious misunderstanding of macro- and multiplier- economic impacts raises questions about the validity of other economic assumptions in the DEIS.</p> <p>Local Foreign Totals and Averages</p> <table> <tr> <td>1,338</td> <td>3,122</td> <td>Job Creation</td> </tr> <tr> <td>\$60,000,000</td> <td>\$140,000,000</td> <td>Total Labor Force Income</td> </tr> <tr> <td>\$44,843</td> <td>\$44,843</td> <td>Average Labor Force Income</td> </tr> <tr> <td>\$106,400,000</td> <td>\$253,000,000</td> <td>Total Gross Island Product</td> </tr> <tr> <td>\$79,522</td> <td>\$81,038</td> <td>Average Gross Island Product</td> </tr> </table>	1,338	3,122	Job Creation	\$60,000,000	\$140,000,000	Total Labor Force Income	\$44,843	\$44,843	Average Labor Force Income	\$106,400,000	\$253,000,000	Total Gross Island Product	\$79,522	\$81,038	Average Gross Island Product	The economic impact analysis in Sections 3.6.1 and 3.6.2 of the EIS was reviewed and updated to include the most recent available information.
1,338	3,122	Job Creation																			
\$60,000,000	\$140,000,000	Total Labor Force Income																			
\$44,843	\$44,843	Average Labor Force Income																			
\$106,400,000	\$253,000,000	Total Gross Island Product																			
\$79,522	\$81,038	Average Gross Island Product																			
Local Agency	Leland Bettis	Pacific Center for Island Security (PCIS)	009	N/A	Comment 009 (submitted via web comment form) is identical to Comment 008 (submitted via email).	See responses to Comment 008.															

Local Agency	Michelle C.R. Lastimoza	Guam EPA	010a	Proposed Action	<p>1. "2.1.2.1 North Ramp It is assumed that fill material would be obtained from higher elevations within the North Ramp project area and from fill suppliers on Guam, such as the Smith Bridge quarry in Yigo." • COMMENT 1: Expanded demand for quarried materials for military construction and off-base construction must be assessed and matched to existing quarries. Due to the finite amount of usable quarried material on island, impacts to this maximum volume should be addressed. The DEIS must propose and evaluate alternative quarry materials sources, to include aggregate importation, that may best serve both the civilian and the military communities on Guam through a comprehensive islandwide partnership (shared development). The use of submarine and/or beach sources of sand is prohibited for new construction.</p> <p>2. "2.1.2.1.8 Construction Personnel and Materials During the site preparation phase of construction, fill material would be delivered from fill suppliers on Guam, such as the Smith Bridge quarry in Yigo, to the North Ramp project site. It is estimated that approximately 100,000 deliveries of fill material by construction vehicles such as dump trucks would be required for potentially in excess of 1,000,000 cubic yards of material. Fill material deliveries would cease once the site preparation phase of construction is completed." • COMMENT 2: Expanded demand for quarried materials for military construction and off-base construction must be assessed and matched to existing quarries. Due to the finite amount of usable quarried material on island,</p>	Chapter 2 of the EIS addresses fill and quarry requirements, including economic benefits in Section 3.6, Geology and Soils Section 3.7, emissions in Section 3.10, and transportation impacts in Section 3.15. Impacts from unknown future projects cannot be analyzed within this EIS.
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					impacts to this maximum volume should be addressed. The DEIS must propose and evaluate alternative quarry materials sources, to include aggregate importation, that may best serve both the civilian and the military communities on Guam through a comprehensive islandwide partnership (shared development). The use of submarine and/or beach sources of sand is prohibited for new construction.	
Duplicate	Michelle C.R. Lastimoza	Guam EPA	010b	Infrastructure	<p>3. "3.10.1.2 Regulatory Overview Potable Water Supply. Potable water at Andersen AFB is regulated by the GEPA under the Guam Safe Drinking Water Act (GPL 14-90) of 1977 and program regulations at Title 22 of the Guam Administrative Rules and Regulations."</p> <ul style="list-style-type: none"> ● COMMENT 3: This section should be revised to reference the current law as Guam Public Law 35-115 repealed and reenacted the Guam Safe Drinking Water Act (GSDWA) on December 11, 2020. ● COMMENT 4: All sections in the DEIS which reference safe drinking water and National Primary and Secondary Drinking Water Regulations should be reexamined to ensure compliance with the proper iteration of the GSDWA as there were significant changes between Guam PL 14-90 and Guam PL 35-115. 	Section 3.9.1.2 of the EIS was revised to reference GPL 35-115. The EIS was reviewed and revised for accuracy when referencing safe drinking water regulations.
Duplicate	Michelle C.R. Lastimoza	Guam EPA	010c	Infrastructure	<ul style="list-style-type: none"> ● COMMENT 5: Guam Drinking Water Regulations are codified via 22 GARR Chapter 6 as a result of Guam PL 35-115 – compliance with these regulations must be demonstrated in the DEIS. 	Section 3.9.1.2of the EIS was revised to include citation to updated regulations in 22 GARR Chapter 6.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Michelle C.R. Lastimoza	Guam EPA	010d	HazMat	<p>4. "3.17.1.1 Hazardous Materials and Wastes The DAF is studying releases of Aqueous Film Forming Foam (AFFF), a historical firefighting foam containing PFAS with the potential to contaminate groundwater."</p> <ul style="list-style-type: none"> ● COMMENT 4: The DEIS should include details about existing AFFF and its containment, spill prevention control and countermeasures and emergency response plans for the containment and remediation of AFFF releases on the project site(s). 	Section 3.16.1.4 was revised to state, "AFFF is not present at the North Ramp and MSA-1 project areas" based on the most up to date information from Andersen AFB.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Michelle C.R. Lastimoza	Guam EPA	010e	HazMat	<p>5. "3.17.1.2 Hazardous Materials and Wastes Environmental Contamination. The Comprehensive Environmental Response, Compensation, and Liability Act governs the response or cleanup actions to address releases of hazardous substances, pollutants, and contaminants into the environment and includes federal facilities such as Andersen AFB. In 1986, Congress formally established the Defense Environmental Restoration Program to provide for the cleanup of DoD property at active installations, Base Realignment and Closure installations, and formerly used defense sites throughout the U.S. and its territories. The two substantive restoration programs under the Defense Environmental Restoration Program are the IRP and Military Munitions Response Program (MMRP). The IRP addresses contaminated sites, while the MMRP addresses non-operational military ranges and other sites suspected or known to contain MEC, which includes unexploded ordnance, discarded military munitions, and munitions constituents."</p> <ul style="list-style-type: none"> ● COMMENT 5: In April 2024, the US EPA designated PFOS and PFOA as hazardous substances under Super Fund. The DEIS should incorporate how the DAF intends to address remediation of these substances as they relate to addressing legacy contamination at Andersen Air Force Base. 	Section 3.16.1.2 revised to indicate certain PFAS are designated hazardous substances and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Section 3.16.2.1 presents impacts from existing PFAS contamination on the Proposed Action.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Michelle C.R. Lastimoza	Guam EPA	010f	HazMat	<p>6. "3.17.1.4 Existing Conditions An installation-wide Preliminary Assessment (PA) was prepared in 2022 for Andersen AFB to identify past and current facility operations that could be potential PFAS sources where AFFF or other PFAS-containing materials were used, stored, or disposed. IRP Sites 78 and 26, both of which were former firefighter training areas, were identified as potential PFAS areas of interest in the PA (NAVFAC PAC 2022). The collection of soil samples for the PFAS PA was completed at these sites in December 2023. Sample analyses are currently in progress, and data validation will occur shortly thereafter. The results will be incorporated into the Final EIS if they are available at that time."</p> <ul style="list-style-type: none"> ● COMMENT 6: Tell us more about the purpose of the analysis, and the other analytes which are included in the Quality Assurance Project Plan. PFAS-containing waste may qualify as hazardous waste if PFAS is mixed with a listed hazardous waste or if a PFAS-containing mixture exhibits a hazardous characteristic. How does the DEIS intend to address this? 	<p>Section 3.16.1.4 revised to include the latest information regarding PFAS investigations on Andersen AFB, including for Sites 78 and 26. Text revised to note PFAS was detected in some soil samples at these sites, and Andersen AFB is now sharing the validated sampling data with regulators and plans to move both sites on to the Remedial Investigation phase of the CERCLA process.</p> <p>Section 3.16.2.1 revised to state CERCLA actions would be performed independent of this EIS and the proposed North Ramp development actions. CERCLA actions would inform the design of the North Ramp development to the extent of possible PFAS contamination and the need to develop PFAS avoidance and management measures to implement the Proposed Action.</p>

Duplicate	Michelle C.R. Lastimoza	Guam EPA	010g	Infrastructure	<p>7. Compliance with the 2006 CNMI & Guam Stormwater Management Manual</p> <ul style="list-style-type: none"> ● COMMENT 7: Guam EPA requires that all storm water disposal systems comply with the requirements of the 2006 CNMI & Guam Stormwater Management Manual, as adopted by Executive Order 2012-02. Permits for and upgrades to stormwater management systems will be required to accommodate the large expected increases to the flows and decreases to quality of the storm water, whether discharged to the ground or to surface waters. New expansion construction and upgrades to air strips, wharves, roads, parking areas or other impervious surfaces should have management controls consistent with the Government of Guam’s legally applied Stormwater Management practices and this must be recognized as part of the mitigation under the DEIS. <p>The mention of the 2006 CNMI & Guam Stormwater Management Manual requirements should be included with all areas which address the project’s Stormwater Pollution Prevention Plan.</p> <p>The DEIS should adequately acknowledge that contractors are responsible for project stormwater management and the DAF or DOD should acknowledge that a “turnkey” mechanism is in place for assuming operational stormwater management once the project is completed and the facility is operational.</p> <ul style="list-style-type: none"> ● COMMENT 8: All proposed activities involving clearing and grading should comply with best management practices applied as required by the 2006 CNMI & Guam Stormwater Management Manual . Environmental Protection Plans (EPP) are required for clearing and grading activities. Stormwater best management practices and erosion control measures 	<p>As noted in Sections 3.4.2.1.2, 3.9.1.2 and 3.9.2.1.2 of the EIS, the DAF would comply with the requirements of the 2006 CNMI and Guam Stormwater Management Manual, which includes obtaining permits prior to construction of or upgrades to stormwater management systems. As noted in Section 3.10.2.1, increased stormwater flows from the North Ramp and MSA-1 construction would be managed in accordance with an NPDES CGP, to include development of an SWPPP, which would be prepared in accordance with the CNMI and Guam Stormwater Management Manuals, Volumes I and II. The SWPPP would include all requirements of the 2006 CNMI & Guam Stormwater Management Manual. Stormwater management systems would be included in the design of the North Ramp and MSA-1 and would not be considered as mitigations.</p> <p>Section 3.9.2.1.2 of the EIS was revised to identify contractor responsibilities during construction.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					shall be implemented for construction and post-construction phases. Prior to the commencement of earthmoving activities must also be obtained.	

Local Agency	Lillian Perez-Posadas, RN, MN	Guam Memorial Hospital Authority	011a	Socioeconomics	<p>The Guam Memorial Hospital (GMH) remains Guam's only civilian, public acute care hospital with a licensed bed capacity of 161 acute care beds and forty (40) long-term care Skilled Nursing Unit at the Skilled Nursing Facility (SNF) at Barrigada Heights. GMHA 's Medical Specialties include the Cardiac Cath Lab, CCU/ICU, ER, Gastroenterology, Interventional Radiology, Pulmonology, Labor & Delivery, OBN/NICU, Pediatrics Intensive Care Unit (PICU), Medical Telemetry/Progressive Care Unit (PCU), OR/PACU; as well as "traditional" Types of Health Care Services that include Inpatient Adult Acute Medical and Surgical Care, Maternal Child Health and Inpatient/Outpatient Rehabilitative, Inpatient/Outpatient Laboratory, Radiology and Respiratory Services.</p> <p>GMHA was created in 1977 pursuant to Public Law (P.L.) 14-29 as an autonomous agency of the Government of Guam. GMHA owns and operates the Guam Memorial Hospital (the "Hospital"). GMHA is supported by six divisions - Administration, Operations, Fiscal Services, Medical Services, Nursing, and Professional Support -to provide healthcare services to all patients regardless of their ability to pay.</p> <p>The total interior square footage of the Guam Memorial Hospital acute-care inpatient facility in Tamuning is approx. 312,351 SF.</p> <p>GMHA also provides outpatient medical services to Department of Corrections (DOC) detainees and inmates pursuant to a September 2015 cooperative agreement. The agreement arose from the Government of Guam's efforts to comply with a court order related to a federal civil case.</p>	<p>Provided information regarding the Guam Memorial Hospital and medical facility capacity was reviewed. It was estimated that the F-15 beddown would result in a 0.2 percent increase of demand on medical facilities. The EIS was reviewed and additional information was added to Section 3.6.2.1 of the Final EIS.</p>
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					<p>GMHA is governed by the Board of Trustees (BOT) composed of 10 members representing backgrounds in healthcare, allied health, nursing, medicine, management, and finance. The GMHA Volunteers Association President is an ex-officio member.</p> <p>Potential Impact to GMH</p> <p>Given the current and antiquated condition of the facility in addition to the limited number of acute care beds, the potential impact are as follows:</p> <ul style="list-style-type: none"> • Blood and Blood Products <ul style="list-style-type: none"> ○ We do not have the capacity to generate or process blood donors hence we procure all our blood transfusion products from the Honolulu American Red Cross • Cardiac-Thoracic Surgical Services <ul style="list-style-type: none"> ○ GMH does not have the capacity or resources thus no open-heart surgeries available or performed • ED/ER bed capacity <ul style="list-style-type: none"> ○ 20 rooms -should there be an influx of individuals needing emergency care, GMH ED/ER will not have the capacity to accommodate more than 20 individuals ○ Occasionally, the ED/ER doctors on duty declare the ED/ER in a "divert" status due to saturation/surge of individuals needing emergency care • Trauma Care Designation <ul style="list-style-type: none"> ○ GMH is not a designated Trauma Center Level It II or III however, we continue to receive, admit and provide emergency/trauma care • Burn Care Services <ul style="list-style-type: none"> ○ GMH does not provide Bum Care services however, we accept and accommodate any burn injuries, we manage and stabilize the 	
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>patient and if patient needs or requests to go off island for further and more intensive bum care, we coordinate the off island referral and transfer.</p> <ul style="list-style-type: none"> • ICU/CCU Capacity <ul style="list-style-type: none"> ○ Although we have fourteen (14) ICU/CCU beds, we currently can only accommodate/admit twelve (12) patients due to shortage of nurses • Neonatal Intensive Care (NICU) Capacity <ul style="list-style-type: none"> ○ Currently no Neonatologist available onsite ○ NICU telemedicine services available 24/7 ○ NICU bed capacity limited to 4 bed units; can expand up to seven (7) but space is also limited • Neurosurgical Capacity <ul style="list-style-type: none"> ○ Only one (1) neurosurgeon available ○ Limited neurosurgery equipment and instrumentations • Orthopedic Surgical Capacity <ul style="list-style-type: none"> ○ Limited orthopedic surgeons • Pediatric Intensive Care (PICU) Capacity <ul style="list-style-type: none"> ○ Limited PICU bed capacity-only four (4) beds 	

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Lillian Perez-Posadas, RN, MN	Guam Memorial Hospital Authority	011b	Socioeconomics/ Mitigation	<p>Other Concerns/Potential Impact</p> <p>1. Reimbursement How will GHMA be reimbursed for the services it provides?</p> <p>2. Additional Staffing Requirements Will there be additional nurses and other healthcare personnel/resources deployed to the hospital?</p> <p>3. Additional Medical Equipment, Supplies and Pharmaceuticals Should there be an influx of acute or long-term respiratory conditions, additional respirators/ventilators and other respiratory-related medical supplies, pharmaceuticals and treatment modalities may need to be procured thus, will these be provided?</p>	The demand on local hospitals from the F-15 beddown was estimated to increase by 0.2 percent. To minimize impacts on Guam medical services, RSAF personnel would receive general health services at the medical clinic on Andersen AFB. The <1% increase in medical services demand would not result in significant impacts on medical services and mitigation measures would not be required.

Local Agency	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012a	Socioeconomics	<p>Existing Conditions [3.7.1.4] The DEIS [Table 3-13] assumes the Active-Duty Military Population on Guam was 6,217 in 2020. However, The Joint Region Marianas (JRM) 2020 Housing Requirements Market Analysis (HRMA)¹ estimated a need to house 6,635 Active-Duty military personnel. The JRM 2020 HRMA sourced information from respective installation data².</p> <p>The DEIS [Table 3-14] assumes 3,544 vacant housing units are available to house the proposed population increases. However, the USCB³ does not consider actual availability of a unit for rent or sale. The USCB utilizes point-in-time counts based on the perceived vacancies of the enumerator at the time of the count. Of note, the USCB warned against the quality of 2020 data collected on Guam as a result of COVID-19.</p> <p>Guam's housing needs study⁴ estimates, that in 2020, 45% of all vacant units on Guam are unavailable for various reasons, which may include estate settlement, foreclosure, personal reasons, legal proceedings, renovation, temporary relocation, or substandard conditions. Housing units unavailable for sale may be non-conforming and ineligible for traditional financing and/or rental units require business licenses and occupancy inspections that may undesirable by property owners.</p> <p>We recommend the methodology include an evaluation of housing units that are vacant and available within the ROI to measure socioeconomic impacts with a reasonable degree of accuracy.</p> <p>On the reasonable basis on the adequacy of the planning process and the</p>	The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available information on housing availability and affordability from the Joint Region Marianas 2024 Housing Requirements Market Analysis.
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>information and/or analysis we register this Substantive Comment.</p> <p>[Footnotes]</p> <p>1 Robert D. Niehaus, Inc. (2020). Joint Region Marianas Housing Requirements Market Analysis</p> <p>2 USNB Guam Housing Office, 2020; Andersen AFB Housing Office, 2020; MCB Camp Blaz, 2020</p> <p>3 United States Census Bureau. (2024). https://www.census.gov/housing/hvs/definitions.pdf</p> <p>4 SMS Research & Marketing Services, Inc. and PCR Environmental Inc. (2020). Housing Study and Needs Assessment. P.17</p>	

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012b	Socioeconomics	<p>The housing market on Guam is divided into three (3) markets, local market, the military market, and the affordable housing market⁵. As a result of limited housing supply, Section-8 Voucher recipients require 90 days on average to find an available rental, in some cases up to 120-days. The Overseas Housing Allowance (OHA) for Guam are either higher rents than locals can afford⁶ or drive income discrimination in favor of OHA rates⁷.</p> <p>We recommend the methodology more thoroughly analyze the local market and consider the impact of housing competition against low-income families. On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment.</p> <p>[Footnotes]</p> <p>5 Leidos, Inc. (2017). Joint Base Marianas Housing Requirements and Market Analysis. ES-4</p> <p>6 Ibid. 5. ES-4</p> <p>7 Reyes R. (2016). Defense Technical Information Center. Overseas Housing Allowance for Guam: A New Way Forward</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.</p>

Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012c	Socioeconomics	<p>Socioeconomic Impacts [3.7] Housing: [3.7.2] Housing insecurity ranges from overcrowding, overburdened households, to homelessness (in its various forms) and has direct causal links that are damaging to environmental justice communities⁸⁹. Children who experience housing insecurity¹⁰ are at high risk¹¹ of stunted childhood development¹², educational interruptions, health issues, and in cases of homelessness¹³, trauma¹⁴. Children who are homeless have twice the rate of learning disabilities and three times the rate of emotional and behavioral problems¹⁵. Homelessness causes or contributes to long-term adverse effects on a child’s neurobiological make-up, cognitive ability, mental health, and have adverse physical health outcomes¹⁶. Children who experience even a short period of homelessness are far more likely to suffer from chronic homelessness through adulthood¹⁷.</p> <p>[Footnotes] 9 Frederick, T.J., Chwalek, M., Hughes, J., Karabanow, J., & Kidd, S. (2014). How stable is stable? Defining and measuring housing stability. <i>Journal of Community Psychology</i>, 42(8), 964–979. DOI: https://onlinelibrary.wiley.com/doi/10.1002/jcop.21665 10 Hock E, Blank L, Fairbrother H, et al. Exploring the impact of housing insecurity on the health and well-being of children and young people: a systematic review. Southampton (UK): National Institute for Health and Care Research (2023) (Public Health Research, No.11.13) https://www.ncbi.nlm.nih.gov/books/NBK598813/ 11 U.S Department of Health and Human Services. Administration for Children and</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.</p> <p>EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i>, identification of child populations, and impacts on child populations is addressed in Sections 3.12.1.2, 3.12.1.4, and 3.12.2, respectively.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>Families. (2024). Caring for the Health and Wellness of Children Experiencing Homelessness.</p> <p>12 Kopko, K. Ph.D. (2022). The Effects of the Physical Environment on Children’s Development.</p> <p>13 Ibid. 8</p> <p>14 Gao, Y., Mi, X., Wang, Y., Zou, S., & Zhou, H. (2021). Association between Household Crowding and Violent Discipline and Neglect of Children: Analysis of Multiple Indicator Cluster Surveys in 26 Low- and Middle-Income Countries. <i>International Journal of Environmental Research and Public Health</i>, 18(4), 1685. DOI: https://doi.org/10.3390/ijerph18041685</p> <p>15 US Housing and Urban Development. Policy Development and Research. (2022). Promoting Mental Health Through Housing Stability.</p> <p>16 Cutts, D. B., Meyers, A. F., Black, M. M., Casey, P. H., Chilton, M., Cook, J. T., ... & Frank, D. A. (2011). US housing insecurity and the health of very young children. <i>American Journal of Public Health</i>, 101(8), 1508–1514. DOI: https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2011.300139</p> <p>17 Ibid. 8. 9.</p>	

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012d	Socioeconomics	<p>In adults, housing insecurity through homelessness, overcrowding, overburdening, and inter-generational situations, singularly, or any combination thereof, is shown to cause increased rates of substance abuse¹⁸, domestic violence¹⁹, suicide, behavioral health problems²⁰, and decreased physical health/life expectancy²¹.</p> <p>[Footnotes] ¹⁸ Center for Addiction Research and Effective Solutions. (2022). Big Ideas-The Social Determinants of Addiction Policies to Address Homelessness and Housing Instability. ¹⁹ Ibid. 11 ²⁰ Ibid. 12 ²¹ U.S Department of Health and Human Services. Office of Disease Prevention and Health Promotion. (2020). Housing Instability.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012e		Health services for Guam's indigent population is strained. Many utilize the emergency department for urgent care, often times in the late or untreated stages of severe illness. Additionally, the emergency department at the Guam Memorial Hospital often has to go on diversion.	The demand on local hospitals from the F-15 beddown was estimated to increase by 0.2 percent. To minimize impacts on Guam medical services, RSAF personnel would receive general health services at the medical clinic on Andersen AFB. The less than 1% increase in medical services demand would not result in significant impacts on medical services and mitigation measures would not be required.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012f		<p>The 2019 Guam Housing Study and Needs Assessment assessed 31,919 households analyzing overall housing demand. Guam’s housing demand is evaluated by three elements; pent-up demand, population demand, and homeless demand. Pent-up demand is made up of four categories; crowded, doubled-up, multi-generational, and hidden homeless²². Crowding on Guam is significantly higher (10.3%) than the national average (3.3%). It is estimated that 6,650 housing units are needed to address pent-up demand, by 2025. Population demand measures organic household growth with an estimated need of 2,768 housing units by 2025. Homeless demand measuring a need to accommodate homeless households re-entering the housing market, by 2025 it’s estimated at 490. Guam is overwhelmed with its community housing demand, as reflected in the 2019 study, requiring a total of 9,908 housing units by 2025 to meet non-military community demand²³.</p> <p>[Footnotes] ²² Ibid. 4 P46. ²³ Ibid. 4 P48.²⁴ U.S. Census Bureau. Guam Census. (2020). Economic Characteristics. Note: Total households, <\$60,000 per year.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012g	Environmental Justice	<p>Current data reflects that 51%²⁴ of households on Guam are likely overburdened. An overburdened household (household with severe cost burden²⁵ is defined as a household spending <50% of their Gross Household Income (GHI) on Housing Costs (shelter cost + utilities). Overburdened households face housing insecurity.</p> <p>Example: An average sized household²⁶ with the GHI of \$67,049 or ~80% of the 2024 Area Median Income (AMI) for Guam; with a median monthly rental cost at \$2,450²⁷ and utility cost of \$500 for a standard 3-Bedroom 2-Bath, their Housing Cost of \$2,950 per month and will be paying 52% of their GHI.</p> <p>[Footnotes] 24 U.S. Census Bureau. Guam Census. (2020). Economic Characteristics. Note: Total households, <\$60,000 per year. 25 24 CFR §91.5 26 U.S. Census Bureau. Guam Census. (2020). General Demographic Characteristics. 27 Guam MLS</p>	<p>Additional housing information from the Joint Region Marianas 2024 Housing Requirements Market Analysis was added to the analysis in Section 3.6.1 to address overburdened households.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012h	Socioeconomics	<p>Reductions in community housing stock will exacerbate excessive supply shortfalls. Increasing housing demand, organic population growth, reasonably foreseeable inorganic growth, and lagging home construction will adversely affect the ROI community and the entire island. Pent-up housing demand and overburdening of households pose serious longterm health and safety issues and will create induced adverse impacts. We recommend the analysis consider the total community housing demand to reasonably evaluate the impact of proposed population growth. Inorganic growth takes limited available housing stock and increases the burden on the local government to address housing insecurity and related social challenges for environmental justice communities. On the reasonable basis on the adequacy of the information and/or analysis we register this Substantive Comment.</p>	<p>The analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include additional information on the condition of the current and future housing market within the ROI from the Joint Region Marianas 2024 Housing Requirements Market Analysis. Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012i	Environmental Justice	<p>Workforce Housing and Labor: [3.7.2.1.2] Non-military community development projects inclusive of housing cannot meaningfully compete for skilled labor and materials as an indirect cumulative impact of MILCON. These cost drivers adversely harm the community. The median price for single-family increased by about 59% between 2018 and 2023. Before COVID-19, demand has increased significantly and supply has not kept. In 2012 the median price was \$210,000.</p> <p>Guam law requires that workforce dormitories be restricted to M-1 (Light Industrial) Zones²⁸. These zones are limited and as a result DOD contractors have resorted to purchasing and/or renting out multi-family housing units. Sizable increases to foreign temporary workers continue to engulf limited housing inventory and adversely impacts local government's ability to secure housing. In a few reported instances, contractors will terminate or cause to be terminated all existing leases in order to utilize the property for temporary foreign workforce housing. When this occurs, families are displaced and face housing insecurity. The local government is investigating this practice to determine its extent.</p> <p>We recommend that the analysis consider local law and consider the practice of displacing families in favor of temporary foreign workers as reasonably foreseeable.</p> <p>We further recommend that the Lead Agency consider displaced families as an indirect result of Federal projects and activities to be assisted under the Uniform Relocation Act.</p> <p>On the reasonable basis on the adequacy of the planning process and the</p>	<p>Additional information from the Joint Region Marianas 2024 Housing Requirements Market Analysis was added to the analysis in Section 3.6 of the EIS.</p> <p>The housing issues on Guam related to island-wide contractor housing is broader than this Proposed Action alone. Housing issues as a result of island-wide military activities and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					information and/or analysis we register this Substantive Comment. [Footnotes] 28 21 Guam Code Annotated §61309(c)(3)	
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012j	Socioeconomics	<p>Sociocultural Impact: Due diligence and consideration should be given to the impact of rapid induced growth. Guam’s indigenous Chamorro population represents 41% of the total population²⁹. Sudden and significant shifts can have unintentional long-term adverse impacts as result of sudden changes to Guam’s sociocultural character from ongoing and proposed activities.</p> <p>In 2017 a survey conducted by the Guam Chamber of Commerce³⁰ indicated that 69% of all surveyed residents supported additional military presence. Among ethnic groups on island, support for additional presence was lowest amongst indigenous Chamorros, at 61%. Sudden and significant populations stand to reduce the represented voice of Guam’s indigenous population on issues that affect their ancestral homeland.</p> <p>We recommend a Socioeconomic Impact Assessment Study be conducted.</p> <p>On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment.</p> <p>[Footnotes] 29 Ibid. 26 30 Webber, L. P. (2017). Pacific Daily News. Most support Guam’s military buildup.</p>	Impacts on the sociocultural environment from the Proposed Action are addressed in Section 3.6.2 with additional information from the Joint Region Marianas 2024 Housing Requirements Market Analysis.

Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012k	Socioeconomics	<p>Cumulative Impact [3.7.3] Housing: The following comments on cumulative impact are submitted pursuant with 40 CFR 1508(g)(2):</p> <p>1. The ROD31 for the Guam and CNMI Military Relocation planned for the construction of on-base housing for all Active-Duty Service Members and families³². The 2020 JRM HRMA³³ anticipates 622 community housing units for occupancy by MCB Camp Blaz military personnel in 2025. This is inconsistent with the proposed plans that drove a classification of “less than significant” impacts to housing. A less than significant finding meant that no housing analysis, alternatives, or mitigations were considered. It remains unclear if housing plans articulated in the Guam and CNMI Military Relocation are reliable or if unanalyzed, unmitigated, and/or unreported divergent plans are in place. This lack of clarity creates a high degree of uncertainty.</p> <p>The Guam and CNMI Military Relocation projected a peak workforce of 5,000³⁴. Presently, temporary foreign workers are ~5,500 resulting in the utilization of 500 community housing units.</p> <p>We require a formal declaration committing to established plans and/or a statement affirming any divergence to housing plans established in the Guam and CNMI Relocation EIS. This is necessary to reasonable analyze the cumulative impact.</p> <p>On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment.</p> <p>[Footnotes] 31 80 FR 5538</p>	<p>The DAF's Proposed Action analyzed in this EIS is separate from the Guam and CNMI military relocation and the island-wide housing issues are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. Sections 3.6.1 and 3.6.2 have been updated with additional information from the Joint Region Marianas 2024 Housing Requirements Market Analysis.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					32 Guam and CNMI Military Relocation EIS (2010); Guam and CNMI Military Relocation SEIS (2014). Appendix D, Socioeconomic Impact Assessment Study Sections 2.2.2.1 and 2.2.2.2 (2014) 33 Ibid. 1 34 Ibid. 32	
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	0121	Socioeconomics/ Cumulative	The DEIS fails to consider with any reasonable analysis, past impacts connected with the homeporting of 3 additional attack submarines between 2021-2022 (USS Springfield, USS Annapolis, USS Jefferson City), bringing an additional 429 submariners ³⁵ and an unknown number of DOD Civilians, DOD contractors, and family members. On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment. [Footnotes] 35 U.S Navy. (2024). https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2169558/attack-submarines-ssn/	Past actions at Naval Base Guam are part of the baseline conditions for the analysis in the EIS. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012m	Socioeconomics/ Cumulative	<p>2. The DEIS fails to consider with any reasonable analysis, past impacts connected with the creation of a VUP-1936 Guam Detachment with an unknown number of military personnel, family members, DOD Civilians, and DOD contractors.</p> <p>On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment.</p> <p>[Footnotes] 36 U.S. Naval Institute. (2020). https://news.usni.org/2020/01/27/navys-first-mq-4c-triton-unmanned-aircraft-deploy-to-guam</p>	The VUP-19 action is considered part of the baseline conditions for this EIS. Noise operations data for the VUP-19 program was used in the noise modeling to create baseline noise conditions, and the associated personnel were included in the Joint Region Marianas 2024 Housing Requirements Market Analysis. Housing requirements data from this recent study was incorporated into Section 3.6.1, Socioeconomics, of the EIS.
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012n	Socioeconomics/ Cumulative	<p>3. The DEIS fails to consider with any reasonable analysis, past impacts connected with the increase in total number of DOD personnel on Guam by 3,829; increasing from about 7,808 in September 2016 to about 11,746 in late 202237.</p> <p>On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment.</p> <p>[Footnotes] 37 DOD, Defense Manpower Data Center, Military and Civilian Personnel by Service/Agency by State/Country (Updated Quarterly); see reports from September 2016 and also September 2022 and December 2022. Reports are available at https://dwp.dmdc.osd.mil/dwp/app/dod-data-reports/workforce-reports.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available information on the current and project Guam population.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012o	Socioeconomics/ Cumulative	<p>4. The DEIS fails to analyze reasonably foreseeable impacts of the addition of the PHNSY & IMF Detachment Guam³⁸. Based on available information, a planned increase of 170 civilian employees and 400 military personnel and an unknown number of family members are anticipated to be permanently assigned on Guam with a proposed operational timeline of 2025. These activities are reasonably foreseeable and must be analyzed for cumulative impact.</p> <p>On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment.</p> <p>[Footnotes] 38 Naval Sea Systems Command. (2021). https://www.navsea.navy.mil/Media/News/Article/2855754/hafa-adaiguam-detachment-in-full-effect/</p>	The PHNSY & IMF Detachment Guam is considered part of the existing conditions for this EIS. The associated personnel were included in the Joint Region Marianas 2024 Housing Requirements Market Analysis. Housing requirements data from this recent study was incorporated into Section 3.6.1, Socioeconomics, of the EIS.
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012p	Socioeconomics/ Cumulative	<p>5. The DEIS fails to analyze reasonably foreseeable impacts of the EIAMDS and growth of JSF capabilities. Defense budget submissions for FY23, FY24, FY25 reflect active EIAMDS planning. We require that, at the very minimum, general estimates of population growth are provided.</p> <p>On the reasonable basis on the adequacy of the planning process and the information and/or analysis we register this Substantive Comment.</p>	The Enhanced Integrated and Missile Defense System is included as a reasonably foreseeable action with relevance to the Proposed Action and is included in the cumulative impact analyses throughout Section 3 of the EIS.

Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012q	Environmental Justice	<p>Summary</p> <p>In 2020 66% (4,403) of military personnel³⁹ were occupying community housing units, 2,317 were unaccompanied personnel. An estimated additional 4,75840 community housing units have been absorbed by defense activities with another 1,19241 more anticipated for 2025. Guam has a community housing need of 9,90842 by 2025. In total, Guam will have a combined housing deficit of 11,100 housing units by 2025.</p> <p>Based on the cumulative impact, the proposed action involving the community housing of 240 personnel, associated dependents, and a conservative estimate of 500 temporary foreign workers will exacerbate ongoing housing shortages caused by shallow planning and rapid population growth, and creates untenable risks to environmental justice communities.</p> <p>Local government housing services and programs are at or near capacity and housing construction cannot keep pace with the demand. Housing insecurity leads to poor health and mental health outcomes and increases crime. The benefits of increased economic activities cannot offset adverse impacts⁴³.</p> <p>On the basis of 40 CFR §1501.3(d)(2)(i), §1501.3(d)(2)(iv), and §1501.3(d)(2)(vii), the Proposed Actions in sections 3.8.2.1.1 and 3.7.2.1.2 create Long-Term, significant, adverse impacts</p> <p>[Footnotes]</p> <p>39 Ibid. 1 ES-1</p> <p>40 Excess Workforce (500); DOD personnel growth (3,829); and Submariners (429).</p> <p>41 Ibid. 1 ES-1 MCB Camp Blaz 2025 Projection. AD Personnel that are supposed to be housed on-base (622).;</p>	<p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was reviewed and revised to incorporate the most recent available housing information, including additional information on housing demand and supply from the Joint Region Marianas 2024 Housing Requirements Market Analysis.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					PHNSY & IMF Detachment Guam Personnel (570). 42 Ibid. 4 P.48 43 40 CFR 1501.3(d)	
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012r	Socioeconomics	Additional Recommendations 1. Conduct a Cumulative Effects Analysis - Design a study-specific methodology entails using a variety of methods to develop a conceptual framework for the analysis. The conceptual framework should constitute a general causal model of cumulative effects that incorporates information on the causes, processes, and effects involved. A set of primary methods can be used to describe the cumulative effects study in terms of multiple causation, interactive processes, and temporally and spatially variable effects.	The methodology for the cumulative effects analysis is discussed in Section 3.3. Potential cumulative impacts that may occur when the impacts from Proposed Action are combined with the impacts of reasonably foreseeable actions with relevance to the Proposed Action are discussed throughout Section 3 of the EIS.
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012s	Other	2. Utilize the Iterative Process (iNEPA). Iterative NEPA encourages the Lead Agency to more actively adapt and modify proposals in response to what they learn during analysis.	DAF has reviewed and taken this comment into consideration.

Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012t	Socioeconomics/ Mitigation	<p>Proposed Alternatives/Mitigations</p> <p>1. "Net-Zero", proposed actions that induces inorganic population growth must build housing for the military community or replace a community housing unit for each one utilized for defense activities.</p> <p>Example:</p> <p>A replacement housing unit can be built vacant Federal property or purchased property and transferred to the Government of Guam to be utilized and preserved as affordable rental units for environmental justice communities.</p> <p>Pursuant to 32 §CFR 989.8(b), reasonable alternatives are not limited to those directly within the power of the Air Force to implement. Due diligence and consideration should be given to interagency assistance such as U.S. Housing and Urban Development or interservice assistance in gathering data to necessary for reasonable alternatives.</p> <p>A Congressional Research Service report⁴⁴ which stated:</p> <p>"It is DOD's policy to rely on the private sector as the primary source of housing for the majority of servicemembers. Yet relying on the civilian housing market carries risks, especially at a time when housing availability in general, and single-family homes in particular, is declining in many parts of the United States. Congress could consider whether or not to assist communities surrounding military installations in offering affordable, adequate, and available housing to support the needs of the military. Congress may consider programs and policies that aim to influence certain local private-sector housing markets."</p> <p>The report provided three recommendations:</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>
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					<ul style="list-style-type: none"> • Congress could consider whether or not to appropriate funding and direct DOD to directly impact local housing markets with existing authorities to provide direct investment, lowinterest loans or other support for housing developers who are committed to providing the type of housing that supports the military community. • Congress could consider whether or not to engage with the Department of Housing and Urban Development or other federal or local agencies to support or incentivize the development of housing that meets the needs of the military community. • Congress may consider programs or tax laws that incentivize housing in military communities. This may include programs similar to the Low-Income Housing Tax Credit (LIHTC) that could target military communities, New Markets Tax Credits (NMTC) or other existing housing programs. <p>In another Congressional Research Services⁴⁵ report:</p> <p>“Congress may consider measures to support expanding housing options in Guam. Housing affects military morale and readiness when servicemembers’ need exceeds current on-base capacity, or when DOD needs to bring in an influx of military contractors to support emerging missions. This need may grow over time if the military population expands. Guam may also need housing to support the temporary labor force that senior military officials say is needed to execute the military construction plans for the next few years. Ensuring a supply of available and affordable housing could reduce strain on the relationship between the people of Guam and the military community by reducing the risk that locals will blame the military for a housing shortage or for rising housing costs”</p>
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					<p>The report provided four recommendations to Congress:</p> <ul style="list-style-type: none"> • Providing funding and direction for traditional Military Construction funds in the annual defense budget to build additional on-base housing for servicemembers. • Providing funding and direction to DOD to initiate development through the Military Housing Privatization Initiative, which involves partnerships with private housing companies. • Providing funding and direction to DOD to execute projects under existing authorizations that allow the Secretary of Defense to provide investment capital, direct loans, loan guarantees or rental agreements to incentivize the private housing market to create housing suitable for servicemembers or residents of Guam. • Providing funding and direction to DOD to work with the Department of Housing and Urban Development to identify options for housing support on Guam. <p>The housing recommendations to Congress provide viable reasonable alternatives that can be explored through interagency or Federal and local partnerships. The NDAA has been utilized many times as a vehicle to address infrastructure needs for both the DOD and the Government of Guam in funding and policy and would not constitute a “major, unlikely change in law or governmental policy” as defined in 32 §CFR 989.8(b).</p> <p>[Footnotes]</p> <p>44Tilghman, A. Congressional Research Service. Military Housing (2023) P.23 45Tilghman, A. Congressional Research Service. Guam: Defense Infrastructure and Readiness (2023) P.38</p>	
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Fernando B. Esteves	Guam Housing and Urban Renewal Authority	012u	Socioeconomics/ Mitigation	2. Delay the Proposed Action for a period of 10-years until Guam MILCON slowdown, workforce housing demands decrease, and more community housing inventory becomes available.	The Proposed Action is needed to enhance DAF's capability to support U.S. and partner nation forces within the Indo-Pacific region and strengthen the U.S.'s ability to respond regionally and worldwide and is a DOD level priority action on a critical timeline for implementation.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	David Dell'Isola	Guam Department of Labor	013a	Socioeconomics	1. Current plans for 240 permanent staff and 200 temporary staff do not seem to make any large impact to the local workforce, however we do see an impact to the community relative to housing, especially for the permanent staff, who may also bring their dependents. Since the staff will not be residing in military housing, it appears that as the project finalizes, the people of Guam will be impacted by the loss of 240 housing units which would otherwise be utilized by the local populace.	As noted in Section 2.1.1.2, the F-15 beddown would include approximately 205 permanent F-15 personnel with 35 total dependents. During periodic training events, which would occur for four-weeks twice per year, an additional approximately 200 unaccompanied support personnel would be required. The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	David Dell'Isola	Guam Department of Labor	013b	Socioeconomics/ Mitigation	<p>GDOL suggests that mitigation may be needed in the form of the Singapore government building housing units to house their own personnel or by the Singapore government building/financing 240 housing units to replace real estate inventory which would be permanently taken off the market by their permanent staff.</p> <p>The housing impact of temporary staff is expected to be minimal since sufficient hotel rooms are available to mitigate that temporary lodging issue.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	David Dell'Isola	Guam Department of Labor	013c	Socioeconomics	2. Based on the cost estimates for the needed construction projects, we feel that sufficient manpower will be available for construction, likely relying on H-2B workers to supplement any lack of skilled U.S. construction workers. However, this assumption is dependent on the project being completed before the end of 2029. Should the project extend past 2029, there is uncertainty as to the availability of H-2B workers until such time as current statutory H-2B exemptions for Guam are extended past 2029.	Thank you for your correspondence. Your comment has been noted. Information on the H-2B worker availability is included in Section 3.6.1 of the EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Agency	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014a	Unsubstantive	<p>This document provides a balanced perspective on the Department of the Air Forces' F-15 beddown proposal, addressing both its strategic benefits and potential local concerns. It offers constructive suggestions for improvement and community engagement while concluding favorably on the project's alignment with national security interests and its potential to enhance Guam's defense capabilities.</p> <p>1.Strengths and Weaknesses Analysis Strengths:</p> <ul style="list-style-type: none"> - Enhances U.S. posture west of the International Date Line. - Strengthens U.S. ability to respond regionally and worldwide. - Supports training requirements for Republic of Singapore Air Force. - Aligns with evolving OAF and DoD strategies for the Inda-Pacific region. <p>Weaknesses:</p> <ul style="list-style-type: none"> - Potential environmental impacts on various resources (air quality, biological resources, etc.). - Possible increase in noise levels due to F-15 operations. - Potential strain on existing infrastructure and utilities. - May raise concerns about further militarization of Guam. 	Thank you for your comment and support of the F-15 Beddown and Infrastructure Upgrades at AAFB EIS.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014b	Socioeconomics	<p>2.Information Gaps</p> <ul style="list-style-type: none"> - Detailed breakdown of economic benefits for the local community. 	Beneficial impacts on the economy from the Proposed Action are addressed in Section 3.6.2 of the EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014c	Mitigation	- Specific measures to mitigate environmental impacts.	Mitigation measures have been identified in the EIS and are included in the Record of Decision.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014d	Infrastructure/ Cumulative	- Long-term plans for increased military presence and its effects on local infrastructure.	Issues as a result of overall military buildup on Guam and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014e	Military Presence	- Potential security implications for Guam as a result of hosting foreign military assets.	National and local security is an important topic that is considered in all DoD decision making. The DoD has established protocols and procedures that DoD and foreign military personnel must follow to protect national and local security.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014f	Proposed Action	- Clear timeline for implementation and completion of the project.	As identified in Section 2.1.2.1 of the EIS, construction of the North Ramp is expected to begin in 2025 and occur over approximately 3 to 7 years. As identified in Section 2.1.2.2, MSA-1 construction would occur over approximately 2 years and may start as early as 2025. As noted in Section 2.1.1, beddown of up to 12 F-15s would occur in 2029. The timelines presented in the EIS are considered to be approximate, as the exact timeline of the Proposed Action is unknown at this time.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014g	Noise	3. Stakeholder and Community Feedback - Concerns about increased noise pollution affecting residential areas.	Impacts from increased noise in residential areas is addressed in Section 3.10.2 of the EIS.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014h	Socioeconomics	- Questions about job opportunities for local residents.	Job creation and other employment impacts are addressed in Section 3.6.2 of the EIS. The exact timeline for job requirements and the bid proposal process is unknown at this time.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014i	Biological Resources	- Interest in environmental protection measures, especially for sensitive ecosystems.	As noted in Section 3.4.2 of the EIS, conservation measures for special status species have been identified by DAF in consultation with USFWS under Section 7 of the ESA and are outlined in the Biological Opinion by the USFWS. The Biological Opinion has been appended to the Final EIS. Other environmental protection measures will be implemented in accordance with federal and Guam regulations.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014j	Land Use	- Worries about potential changes in local land use and access to recreational areas.	Impacts on land use are addressed in Section 3.13.2 of the EIS. Impacts non recreation are addressed in section 3.14.2 of the EIS.
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014k	Military Presence	- Curiosity about the long-term commitment of Singapore's Air Force presence.	The timeline for cessation of RSAF F-15 operations at Andersen AFB cannot be determined at this time; therefore, RSAF F-15 operations are considered permanent. Additional NEPA compliance would be required prior to any future cessation of activities proposed in this EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	0141	Socioeconomics/ Mitigation	<p>4. Suggestions for Improving Civilian-Military Relationships</p> <ul style="list-style-type: none"> a. Establish a joint civilian-military committee to oversee the implementation of the project and address community concerns. b. Develop a local workforce training program to prepare Guamanians for skilled jobs related to the F-15 beddown and infrastructure upgrades. c. Create a public outreach program to educate the community about the strategic importance of the project and its benefits to Guam's economy and security. 	Changes to the public relations processes between the DAF and Guam residents are not within the scope of this EIS. Joint Region Marianas acts as the interface between DoD components and tenants through assigned regional installations on Guam and the Northern Mariana Islands and the civilian community.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Esther J.C. Aguigui	Guam Department Homeland Security/Office of Civil Defense	014m	Unsubstantive	<p>5. Conclusion:</p> <p>As the Homeland Security Advisor for Guam, I conclude that this proposal aligns with our National Security interests and enhances the defense capabilities of Guam and the United States. The F-15 beddown and infrastructure upgrades at Andersen AFB will significantly improve our strategic posture in the Indo-Pacific region, strengthening our ability to respond to regional and global challenges.</p> <p>The proposed project not only bolsters our military capabilities but also presents opportunities for economic growth and international cooperation. By hosting the Republic of Singapore Air Force, we reinforce our commitment to regional partnerships and collective security.</p> <p>While there are potential environmental and community impacts to consider, I believe that with proper planning, mitigation measures, and ongoing dialogue with the local community, we can address these concerns effectively. The suggestions for improving civilian-military relationships will be crucial in ensuring the project's success and long-term acceptance by the people of Guam.</p> <p>This initiative represents a significant step forward in enhancing our defensive capabilities while potentially bringing economic benefits to our island. I recommend moving forward with this proposal, with the understanding that continuous engagement with the community and careful attention to environmental and social impacts will be essential throughout the implementation process.</p>	Thank you for your comment and support of the F-15 Beddown and Infrastructure Upgrades at AAFB EIS.

Local Agency	N/A	Customs and Quarantine Agency	015	Socioeconomics	<p>With Guam outside the Customs Territory of the United States, the customs administration is carried out by the Government of Guam, further delegating these authorities and responsibilities to the Guam Customs & Quarantine Agency (CQA), carrying out customs controls and formalities at all ports of entry into the territory. CQA is charged with securing all of Guam's ports of entry, facilitating trade and commerce, performing inspections and clearances of all persons and conveyances arriving into Guam; preventing the spread of communicable diseases; interdiction of illicit contraband, terroristic implements and components; conduct criminal and administrative investigation related to customs violations and other centric border functions correlating with our collaboration with other local and federal agencies. As cooperators for the U.S. Department of Agriculture's Animal Plant Inspection Service on Guam, CQA performs inspections and regulates the movement of agricultural commodities to prevent the introduction of invasive pests and animals or plant diseases .</p> <p>As of 2023, personnel resources include 142 Uniformed Officers and 18 Civilian Staff, executing customs border control missions and responsibilities at the Guam International Air Terminal, Air Cargo facility, Port Authority of Guam and marinas, Guam Main Facility, and on DoD installations in the U.S. Naval Station and Andersen Air Force Base (AAFB). Customs service demands and personnel shortages at these locations is consistently an issue to optimize staffing and service these areas. To meet these goals and demands, the agency is pursuing recruitment to increase personnel and other allowable</p>	<p>Personnel and dependents, and construction worker requirements are discussed in Section 2.1 and 3.6.1 of the EIS. Equipment and materials requirements for construction are unknown at this time. The DAF and partner nation forces at Andersen AFB will adhere to all applicable customs and clearance requirements and coordinate with CQA as required.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>mechanisms to increase our operability at all our areas of responsibilities. The Department of the Air Force F-15 beddown and infrastructure upgrades at AAFB will increase demands for CQA services in our operations and roles we engage in protecting Guam's environment.</p> <ul style="list-style-type: none"> • The EIS should take in consideration any and all information directly related to the inspection of arriving passengers, crew, support personnel and freight in order for CQA to determine the requirements for its operations to meet the demands of increased activity at AAFB. Additionally, the information must also include the importation of equipment, tools, materials and contract skill labor force that will be used for the construction infrastructure upgrades anticipated in the harding or erecting of military facilities supporting the operation. This information is necessary in order for the agency to assess its operational needs at AAFB as well as at the GIAA and PAG. 	

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	N/A	Customs and Quarantine Agency	015	Other	<ul style="list-style-type: none"> The EIS should take in consideration the review of the current DoD Foreign Clearance Guide (FCG), specifically for customs clearances with CQA. Such a review is pertinent to the planned F-15 beddown and infrastructure upgrades at AAFB, as updating of the guide will memorialize CQA clearance processes, procedures and protocols necessary to prevent the introduction of pest, disease or other types of commodities detrimental to the environment. 	<p>Thank you for your correspondence. Revisions to the DoD Foreign Clearance Guide are beyond the scope of NEPA and the EIS.</p> <p>The DAF and partner nation forces at Andersen AFB will adhere to all applicable customs and clearance requirements.</p> <p>The Armed Forces Pest Management Board coordinates DoD activities to prevent and control the spread of invasive species, on, to, or from military bases. The DAF would require the construction contractor to ensure protocols are in place to prevent or minimize the introduction of diseases and invasive species to the project areas.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	N/A	Customs and Quarantine Agency	015	Biological Resources	<ul style="list-style-type: none"> • The rate of introduction of invasive species in Guam has grown exponentially. One factor has been through their unintentional transport on military cargo and personnel transport, as well as on warships. The EIS should include any and all information pertaining to potential impacts from the introduction of invasive species due to the transportation of materials and conveyances in relation to the deployment and operation of the Republic of Singapore Air Force (RSAF) F-15 beddown and infrastructure upgrades at Andersen AFB. Additionally, the EIS should include the identification of resources, inclusive of funding, for assets and agreements for vigilance, mitigation, eradication, and management of invasive species as well as other threats. • Invasive species have threatened native plants and animal populations that have been detrimental to the island's ecosystem. This has harmful consequences to Guam's traditional practices and food sources. The EIS should include an assessment of the potential for the transportation of invasive species and DoD's efforts to mitigate their introduction in Guam. 	Invasive species are addressed in Section 3.4.1 of the EIS. The Armed Forces Pest Management Board coordinates DoD activities to prevent and control the spread of invasive species, including the BTS, on, to, or from military bases. The DON and DAF, as well as other federal, state, territorial, and commonwealth agencies, actively participate in the Brown Treesnake Control and Eradication Committee, established by U.S. Congress under the Brown Treesnake Control and Eradication Act of 2004. Additional information on invasive species, their impacts, and management measures have been included in Section 3.4.1.4.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	N/A	Customs and Quarantine Agency	015	Socioeconomics	<ul style="list-style-type: none"> To address the service demands of CQA during all phases the beddown and infrastructure upgrades will create, the EIS should include that DoD identify provisions permitting the inclusion into the budgets of military installations for reimbursement for CQA's services, such as those found in the Defense Transportation Regulations Part V-502-7 thru 9. Also to examine existing financial service programs in the government of Guam specifically for CQA services. 	Thank you for your correspondence. The CQA mitigation is not fiscally permissible, so the mitigation was not adopted.
Duplicate	N/A	Customs and Quarantine Agency	015	Other/Mitigation	<ul style="list-style-type: none"> EIS should also assess CQA's current processing and office space on AAFB, to determine its operability, capacity, functionality, serviceability and current mitigation measures for handling arrivals. This is necessary for proper containment, handling and prevention of commodities that serve as a means of conveyances of unwanted invasive species detrimental to the environment and fragile ecosystem. Finally, the Government of Guam would need additional support for the construction of its Customs Satellite Inspection Facility at the Port Authority of Guam. Once built, this facility will provide CQA with a controlled and sterile facility for inspections of imported commodities to include those that support the planned military activity within a location that can contain and minimize invasive species or diseases that will negatively impact the environment. 	Thank you for your correspondence. The CQA mitigation is not fiscally permissible, so the mitigation was not adopted.

Local Political	Judith Won Pat	Chief Advisor to Governor on Education	016a	Noise	<ol style="list-style-type: none"> 1. Noise is immense around the level of a loud rock concert. 2. Teachers and students can not communicate, hear or concentrate on the instruction of the day. Speech interference - 3. Elevated noise levels can cause difficulty in students understanding the teacher or each other, causing them to use part of their attention for hearing what is being said, rather than focusing on the content. 4. Over a period of time, students and teachers will experience anxiety every time they hear planes flying over the school and playground. 5. Faculty and staff will need to organize the day and activities around the jets flying. 6. Noise causes substantial health problems. 7. Military aircraft noise is substantially more intense and disturbing than commercial jets. 8. Families are used to hearing and seeing commercial planes take off and land but military aircraft are substantially louder and more intense when flying, combat maneuvers, etc. 9. Noise exposure affects human health, hearing and quality of life. 10. Flying around and above schools in the area are exposed to levels that have shown to put children at risk of delayed learning. 11. The effects of a fighter jet flying over a residential area can include noise disturbance, potential damage to structures due to sonic booms, and concerns about safety and security. 12. The noise generated by jet engines can be disruptive, impacting daily 	<p>Noise and from F-15 operations and its effect on nearby communities is addressed in Section 3.10 of the EIS. Most noise studies indicate that, in general, individuals habituate and become accustomed to aircraft noise over time.</p> <p>Health effects of noise, such as sleep awakenings and hearing loss, were assessed in Section 3.10.2.1 of the EIS.</p> <p>In general, it is true that military aircraft noise is substantially more intense and disturbing than commercial jets. This is true for 5th generation fighters, however, unlike the F-22 and F-35, the proposed F-15s would be comparable to many commercial jets.</p> <p>EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i>, identification of child populations, and impacts on child populations is addressed in Sections 3.12.1.2, 3.12.1.4, and 3.12.2, respectively.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					activities and causing stress. Sonic booms, if produced, may lead to structural damage or heightened anxiety. 13. Safety concerns arise, and regulations are in place to manage such flights over populated areas to minimize adverse effects on residents' well-being and property	
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016b	Proposed Action	14. How close are US military fighter jets allowed to fly to the ground in residential areas? 15. What hours will these military jets be flying around? Night, day time during school hours?	F-15 operations would be consistent with existing aircraft operations at Andersen AFB. In general, aircraft do not fly at low altitudes over Guam unless performing takeoff and landing operations, which occur at either end of the runways. As noted in Section 2.1.1.1, approximately 10 percent of F-15 operations would occur during nighttime.
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016c	Noise/Mitigation	16. Will the military retrofit windows and doors of the homes where these military jets are flying around? 17. It has been documented that "high speed," shock waves and intense loud noise have blown out many windows and doors of homes.	The DAF primary noise reduction strategy is implementing in flight protocols and practices, and the tracking of noise complaints and resolution. The primary protocol/ to reduce noise at the base is to execute the majority of take-offs and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and will be the standard practice for the proposed F-15s. Architectural upgrades and other noise reduction elements have not been carried forward as an additional mitigation measure in the Final EIS or ROD. The effects of noise on structures is addressed in Section 3.10.2 of the EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016d	Public Safety	<p>18. Military aircraft/fighter jets should avoid flying over populated areas for several reasons, including safety concerns and noise reduction. Flying over densely populated areas can pose a risk to people on the ground if there were to be an accident or malfunction of the aircraft.</p> <p>19. The sonic booms and shock waves caused by fighter and bomber jets flying above Mach 1 caused the cows in Dixie Valley, Nevada to stop giving milk and broke windows in several houses. Our local farmers who raise cattle, goats, egg laying hens, etc will be impacted greatly.</p>	<p>F-15 operations would be consistent with existing aircraft operations at Andersen AFB, which includes avoiding flying over populated areas when possible. As noted in Section 3.10.1.2, flight along Andersen AFB's cliff line is restricted to 1,000 feet above ground level or higher to avoid environmentally sensitive areas.</p> <p>As with existing overflights at Andersen AFB, the proposed F-15s would not fly at supersonic speeds (i.e., Mach 1) and therefore would not generate sonic booms.</p> <p>Information on noise generated by F-15s is included in Section 2.11 of the EIS.</p>
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016e	Noise	<p>20. 19.FAA regulations, and depending on the location, the anti-military sentiments within the population of the US of A. There are specific regulations regarding minimum flight altitudes; and at all airports/air bases regarding climbing to a certain altitude on take-off as quickly as possible to minimize any noise. Also, low altitudes are not friendly to any high-speed jet aircraft occupied by birds, ducks, geese, and small aircraft.</p>	<p>All aircraft and pilots at Andersen currently, and will continue to, operate in strict compliance with all FAA regulations.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016f	Public Safety	<p>21. Military aircraft are not typically allowed to fly over populated areas for a variety of reasons, including safety and security concerns.</p> <p>22. Safety: Military aircraft are often equipped with powerful engines and weapons, and they can pose a significant risk to the safety of people on the ground if something goes wrong. For example, if an aircraft were to experience mechanical failure or a pilot were to lose control, it could cause significant damage and loss of life.</p> <p>23. Security: Allowing military aircraft to fly over populated areas could pose a security risk, as it could make it easier for terrorist groups or other hostile actors to target civilian populations.</p>	The potential for aircraft mishaps and mishap procedures is addressed in Section 3.12.2 of the EIS. No populated areas underlie the runway Clear Zones, which are the areas considered to have the highest potential for aircraft accidents.
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016g	Noise	<p>24. Noise pollution: Military aircraft are often quite loud, and flying over populated areas could cause significant noise pollution and disturbance to local residents.</p>	Noise from F-15 operations and its effect on nearby communities is addressed in Section 3.10 of the EIS.
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016h	Airspace	<p>25. Airspace regulations: Civilian air traffic is not allowed to fly over many military bases and installations, and military aircraft often need to fly in these restricted airspace for training or operational reasons.</p>	The FAA has established restricted areas to protect aircraft from safety hazards. The airspace overlying Andersen AFB is not considered restricted airspace and is open to commercial aircraft in coordination with air traffic control.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Judith Won Pat	Chief Advisor to Governor on Education	016i	Public Safety	26. The potential harms can be quite serious: "Imagine people trying to sleep, or children in school trying to understand their teachers and you've got these jets flying." Noise events in excess of 100 decibels when jets are flying are harmful to human health.	Noise from F-15 operations and its effect on nearby communities, including the potential for annoyance and speech interference, is addressed in Section 3.10 of the EIS. EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i> , identification of child populations, and impacts on child populations is addressed in Sections 3.12.1.2, 3.12.1.4, and 3.12.2, respectively.

Local Political	Sabina Flores Perez	Senator, 37th Guam Legislature	017a	Biological Resources	<p>This comment is in opposition to the Proposed Action stated in the Draft Environmental Impact Statement (EIS) for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base (AFB), Guam, relative to the proposed construction of infrastructure upgrades, and to beddown and support the mission requirements of up to twelve F-15 fighter aircraft at AFB, Guam. I oppose the Proposed Action and urge for the adoption of the No Action Alternative for the following reasons:</p> <ul style="list-style-type: none"> • The Draft EIS identifies multiple alarming adverse impacts onto endemic species, including special status species, and critical habitat, and presents alarming gaps in its research methodology, findings, and analysis. The adverse impacts identified by the Draft EIS include: the destruction of 150.7 forested acres (i.e. 1.4% of the total forested habitat on AFB), including the complete unsuitability of Vitex Forest to support the survival of endemic species; the increased exposure of endemic species to aircraft operations by approximately 32%, resulting in species' temporary or permanent relocation, and increased vulnerability of the fanihi, or Mariana Fruit Bat (<i>Pteropus mariannus</i>) to flushing; the destruction of six special status plants; the increased exposure of marine animals to distress resulting from encroaching stormwater drainage; the increased potential of invasive species introduction; the generation of hazardous materials and wastes; and significant cumulative impacts onto the Northern Guam Lens Aquifer (NGLA) and consequently potable water (i.e. drinking water). <p>A multitude of these adverse impacts are identified as "short-term" and/or "less than significant" in the Draft EIS. There is a</p>	<p>DAF worked closely with and formally consulted with U.S. Fish and Wildlife Service (USFWS) regarding impacts to threatened and endangered species. A Biological Assessment was submitted in this process and included conservation measures to address impacts to the species and their associated habitat. Conservation measures outlined in the Biological Opinion that was issued by USFWS will be considered for adoption in the Record of Decision. The Biological Opinion is appended to the Final EIS.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>concerning disparity between these findings, and those demonstrated by multiple scientific studies and traditional ecological knowledge (TEK) concerning the critical correlation between the health of Guam’s critical limestone forest habitat and the survival of the island’s endemic, endangered species.1 Scientific studies and CHamoru traditional ecological knowledge (TEK) have demonstrated that the conservation of the areas within and surrounding the ROI is essential to endemic species’ survival, and that military expansion and operations are extremely injurious to this vulnerable ecology.2</p> <p>[footnotes]</p> <p>1 Else Demeulenaere, “Conservation Management of the Mariana Eight Spot Butterfly” (2018); Demeulenaere and Stefanie M. Ickert-Bond, “Guam’s last háyun lágu tree (<i>Serianthes nelsonii</i>) in peril,” <i>Conservation Science and Practice</i> (October 2023);</p> <p>2 Ibid.</p>	
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017b	Biological Resources	<p>There is a lack of transparency and clarity regarding the omission of environmental surveys. Section 3.4.1.4 notes that no marine resources surveys were completed for the EIS because “no in-water construction is proposed,” however, Section 3.4.1.3. of the Draft EIS notes that the construction and operation of the North Ramp and MSA-1 project areas can potentially introduce stressors to the marine environment via stormwater runoff.</p>	<p>Essential fish habitat is discussed in Section 3.4.1.4.4 and analyzed in Section 3.4.2.1. Construction of stormwater management infrastructure to minimize impacts to marine resources is described in Section 2.1.2.1.7.</p>

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Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017c	Biological Resources	Per Section 2.1.1, the Draft EIS “does not propose or analyze increased air operations beyond what is addressed by the MITT ROD or MITT supplemental ROD,” yet the Draft EIS identifies various adverse impacts onto fanihi and other species directly affected by these operations.	The draft EIS analyzes noise impacts from the operations of up to 12 F-15; however, the actual air operations are analyzed under MITT which has the capacity to include the additional air operations these aircraft represent.
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017d	Water Resources	The Draft EIS notes adverse impacts onto the NGLA due to the Proposed Action’s construction and operations. Stormwater runoff and accidental leaks of fuel, lubricants, or coolant would adversely affect the NGLA. While the Draft EIS notes that adverse impacts resulting from spills and leaks during operations are “anticipated to be short term and less than significant,” these findings are extremely alarming given the limited scope of the Draft EIS expounded upon throughout this comment.	The EIS acknowledges potential adverse impacts and notes that construction of stormwater management infrastructure to minimize impacts are described in Section 2.1.2.1.7.
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017e	Water Resources	Additionally alarming are the Draft EIS findings of “significant but mitigable, short-term, localized, cumulative impacts on potable water” as an “unavoidable adverse impact” of the Proposed Action. There is a lack of clarity in both the magnitude and mitigation measures of this impact, as well as a lack of transparency demonstrating the research and analysis that determined the impact to be “mitigable, short-term, and localized.” As the NGLA is Guam’s primary drinking water source and supplies over 80%-90% of our island’s drinking water, the Draft EIS must comprehensively address the lack of clarity and transparency surrounding the Proposed Action’s impacts upon our aquifer.	While Section 3.8.3 notes cumulative impacts would be slightly increased, it also notes that ongoing and reasonably foreseeable construction projects are required to comply with federal guidance and regulations to minimize impacts.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017f	Biological Resources	The Draft EIS also fails to comprehensively analyze the environmental effects of the Proposed Action relative to the impacts of Super Typhoon Mawar. Lines 6-10 of Section 3.4.1.4 are the sole mention of Super Typhoon Mawar’s impacts, and briefly note “substantial changes to the forest canopy, including considerable defoliation and an extensive amount of downed vegetation from 140-mile-per-hour winds.” Interrelated to this lack of transparency and clarity on the extent of Super Typhoon Mawar’s impacts, is the brevity of discourse (i.e. Lines 8 - 10, Section 3.4.1.4) concerning a “post-typhoon survey” that “confirmed that the forested areas are in post-typhoon recovery” and that “overall vegetation communities remain unchanged.” The Draft EIS fails to elaborate on: (a) the research methodology, findings, and analysis concerning the “post-typhoon survey” conducted from December 2023 to March 2024; (b) the application, if any, of the “post-typhoon survey” towards the Draft EIS’s analysis of environmental impacts; (c) if the “post-typhoon survey” was a single survey or group of surveys, and in the case of the former, the reason as to why a single survey would only be pursued; and, (d) the sufficiency of the survey’s scoping period given that the island’s environment continues to recover post-Super Typhoon Mawar.	The 2021 and 2024 Biological Survey Reports that support the EIS and the analysis are available upon request by emailing afcec.aafb.infrasandf-15eis@us.af.mil. Clarification that the analysis includes consideration of the 2024 biological survey has been added to Section 3.4.2.

Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017g	Biological Resources	<p>Concerning the special status plant fadang (<i>Cycas micronesica</i>)—of which 439 observations are identified in the Proposed Action’s construction footprint—Super Typhoon Mawar is the first major environmental disturbance to compromise fadang’s resilience since the 2003 introduction of the invasive cycad aulacaspis scale (<i>Aulacaspis yasumatsui</i>).³ Per an August 2023 scientific study authored by scientists of the Cycad Specialist Group of the International Union for Conservation of Nature’s Species Survival Commission (IUCN SSC), 20% of the fadang population experienced partial defoliation; 52% experienced complete defoliation; 19% experienced windsnap elevated; 8% experienced windsnap at ground; and 1% experienced windthrow. In the habitats with most tree damage, 72% of fadang were defoliated with a majority of this percentage being completely defoliated; 27% were damaged by windsnap; and 1% of trees experienced windthrow.⁴ Due to the severe depletion of the plant’s energy reserves in combatting the cycad aulacaspis scale, refoliating fadang are even more susceptible to mortality. Furthermore, there is a strong likelihood for increased windsnap of surviving fadang due to additional stem borer damage caused by the native <i>Acalolepta marianarum</i>, and a strong likelihood for increased herbivory of windsnap stems by feral swine. The likely increase of invasive plant density also presents major concerns to the health of the fadang population, as the impacts of invasive plants onto fadang have not been scientifically determined. Failure to exercise the precautionary principle under these circumstances goes against the best scientific advice, and increases the</p>	<p>Information and analysis on biological resources is included in Sections 3.4.1 and 3.4.2 of the EIS. Conservation measures to offset impacts from the Proposed Action have been developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures include the development of a protected habitat enhancement area. All conservation measures are detailed in the Biological Opinion issued by USFWS, which is included in Appendix B.</p>
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					<p>risk of fadang’s decline and Guam’s inability to manage it in their publicly funded conservation projects. Compounding these issues is the study’s findings that current conservation efforts are insufficient albeit fadang’s preservation is attainable, as existing efforts continue to prioritize minimal conservation impact against scientific recommendations for more stringent conservation measures.⁵</p> <p>The destruction of the threatened fadang poses a grave threat to maintaining Guam’s already precarious native ecosystem, of which fadang is the primary vegetation in midand upper- canopy categories and the most predominant arborescent species in Guam’s forests. Studies find that the loss of fadang greatly increases the potential for permanent loss of biodiversity, including fadang’s insect pollinators and endemic arthropods such as <i>Dihammus marianarum</i>. Furthermore, there is an observed symbiosis between fadang and the endangered, endemic fanihi, wherein fadang seeds provide a sole food source for the fanihi following environmental disturbances (i.e. destructive winds and cyclones). While this crucial relationship is confirmed, the impacts of fadang loss onto the fanihi are still unknown and necessitate further study prior to any adverse intervention.⁶ This is especially pertinent given the single remaining colony of fanihi and the majority of its foraging occur in limestone forests in US military lands, of which the ROI concerns,⁷ and the vulnerable state of our island’s recovery following the recent Super Typhoon Mawar.</p> <p>[Footnotes]</p> <p>³ Lindström et al., “Typhoon Mawar Enables an Assessment of <i>Cycas micronesica</i> Conservation Plans,” <i>Journal</i></p>	
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>of Geography & Natural Disasters Vol. 13, Iss. 3, No. 1 (August 2023).</p> <p>4 Ibid.</p> <p>5 Ibid.</p> <p>6 Jody Haynes, "Exotic Invasive Pest Insect Critically Threatening Guam's Vulnerable Flora, Fauna & Island Ecosystem."</p> <p>7 U.S. Fish & Wildlife Service, "Draft Revised Recovery Plan for the Mariana Fruit Bat or Fanihi (pteropus mariannus)" (2009).</p>	

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017h	Biological Resources	<p>The Draft EIS's deficiency of findings and analysis relative to Super Typhoon Mawar's impacts is extremely alarming given that Mawar is the strongest typhoon Guam has endured in a little over two decades⁸ and resulted in the near 100% defoliation of trees in central and northern Guam—including areas concerning the ROI.⁹ Compounding the Draft EIS's inadequacy is the insufficiency of existing conservation efforts for fadang and other species, of which the Draft EIS fails to elaborate on how these critical gaps in conservation are being addressed. Further research and analysis adhering to scientific recommendations and TEK are necessary to determine the Proposed Action's environmental impacts holistically.</p> <p>[Footnotes]</p> <p>⁸ Pacific Islands Climate Adaptation Science Center, "Typhoon Mawar batters Guam; PI-CASC Guam lead conducts aerial damage assessment."</p> <p>⁹ National Weather Service (NWS) Guam, "Meteorological Report on the Effects of Super Typhoon Mawar (02W) in Micronesia and the Marianas" (20-28 May 2023).</p>	<p>The 2021 and 2024 Biological Survey Reports that support the EIS and the analysis are available upon request by emailing afcec.aafb.infrasandf-15eis@us.af.mil. Conservation measures to offset impacts from the Proposed Action have been developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures include the development of a protected habitat enhancement area. Conservation measures are detailed in the Biological Opinion that was issued by USFWS, which is included in Appendix B.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017i	Socioeconomics	<ul style="list-style-type: none"> Housing incoming personnel off-installation will exacerbate Guam’s current housing crisis. The Draft EIS notes that the Proposed Action would bring in an additional 240 personnel and their dependents, and beginning in 2030, an estimated 200 support personnel during training events held 2 months per year—all of which are assumed to reside in off-installation housing on Guam. Both an increase in personnel and to house all off-installation only compounds Guam’s inability to meet the housing demand and supply of its local population and any incoming military population. Already, the island’s local population cannot afford housing in a rapidly competitive housing market caused by the ongoing military buildup, wherein an increased demand, limited supply, and the Overseas Housing Allowance (OHA) have come to dictate Guam’s housing market.¹⁰ <p>[Footnotes] ¹⁰ Guam Housing and Urban Renewal Authority (GHURA), “Guam Housing Study and Needs Assessment” (January 2020).</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability.</p>

Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017j	Environmental Justice/ Socioeconomics	<p>To contextualize the insecure economic state of our local population, the 2020 Decennial Census of Island Areas by the U.S. Census Bureau reports 16.8% of people in families in Guam (excluding families in military housing units) had income below the poverty line and 20.2% of all individuals in households (excluding people in military housing units) had income below the poverty line. In Yigo, 16.4% of people in families (excluding families in military housing units) had income below the poverty line, and 19.8% of all individuals in households (excluding people in military housing units) had income below the poverty line. Relative to 8.5% of people in families and 10.5% of individuals holding income below the poverty level nationally, Guam's local population—including the village most approximate AFB—is disproportionately higher.¹¹ Compounding these circumstances is the OHA's extremely high stipend that ranges from \$2,205 to almost \$3,000,¹² which is far more than what our local community—and even communities in the U.S. states¹³—can afford for rent or mortgage. Consequently, the housing market predominantly matches the OHA's price point, and our local community is both outpriced and underserved relative to the incoming military population. The adverse impacts onto the local population extend to the island's social services, who struggle to connect clients to affordable housing units under these difficult housing conditions. With the military population projected to increase by 2,500 people by 2026 and another 15,500 people by 2037—culminating in almost double the current military population¹⁴—the island's housing crisis will only worsen and thus on installation housing must be utilized to</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone.</p> <p>Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from the Joint Region Marianas 2024 Housing Requirements Market Analysis.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>its fullest capacity. DoD possesses the capacity to provide on-base housing to all incoming military personnel, as evidenced by reports of on- installation housing being up to 50% unoccupied in these past years and the recent development of Marine Corps Base Camp Blaz.</p> <p>[Footnotes]</p> <p>11 Missile Defense Agency, “Proposed Final Environmental Assessment/Overseas Environmental Assessment” (May 2024).</p> <p>12 “Overseas Housing Allowance Rate Lookup,” Defense Travel Management Office (DTMO), https://www.travel.dod.mil/Allowances/Overseas-Housing-Allowance/OHA-Rate-Lookup/.</p> <p>13 Anna Bahney, “Half of US tenants can’t afford to pay their rent. Here’s what’s ahead,” CNN, January 30, 2024.</p> <p>14 Joe Taitano II, “Military: Population to grow by 2,500 over next 2 years, roughly 18K by 2037,” Pacific Daily News, March 12, 2024.</p>	
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017k	Mitigation	<ul style="list-style-type: none"> Mitigation measures have not been identified. The impacts identified necessitate implementing measures to both address and mitigate them. 	<p>Mitigation measures to alleviate island-wide housing issues are beyond the scope of this EIS and would be determined at higher levels between Joint Region Marianas and the Government of Guam. Any mitigation measures identified to reduce the impacts from this Proposed Action alone would be included in the Record of Decision.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	0171	Cumulative	Cumulative impacts should also be addressed including but not limited to: all simultaneous and ongoing military activities and construction; the acquisition of comprehensive data on air quality and water quality in Guam as impacted by the Proposed Action; stressors on terrestrial and marine life from all military activity; stressors and impacts on native and endangered species due to deforestation, construction, and noise from military activities, etc.	The methodology for the cumulative effects analysis is discussed in Section 3.3. Potential cumulative impacts that may occur when the impacts from Proposed Action are combined with the impacts of reasonably foreseeable actions with relevance to the Proposed Action are discussed throughout Section 3 of the EIS.
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017m	Public Review Period	<ul style="list-style-type: none"> The public commentary period is insufficient for the People of Guam to comprehensively assess and respond to the Draft EIS. There were concerns brought up by members of the community who attended the July 17, 2024 public meeting for the Draft EIS. Court reporters were present to accept verbal comments, there was no formal presentation or town hall style meeting to fully address the public's concerns per public hearing participants. Evidenced by these concerns, DoD has not sufficiently facilitated comprehensive dialogue relative to the Draft EIS and its Proposed Action. Further efforts to facilitate meaningful collaboration with the community must be undertaken for the People of Guam to both be informed of and respond to the Draft EIS comprehensively. 	The public comment period was compliant with NEPA and consistent with Joint Marianas Region draft EIS public meeting format.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017n	Cultural Resources	<ul style="list-style-type: none"> Disturbance of cultural resources would result from the Proposed Action, and the magnitude of this disturbance is unclear per the Draft EIS's omission of two project consultations under Section 106 of the National Historic Preservation Act (NHPA). The Draft EIS identifies 33 cultural resources within 0.25 mile of and in the Area of Potential Effect (APE), and at least 3 cultural sites are eligible for the National Register of Historic Places (NRHP). Furthermore, separate project consultations concerning the P-94 electrical lines and Site 66-08-2102 (P-3105 storage igloos) were omitted from the Draft EIS. Many of Guam's historical and cultural sites have been uprooted due to military activity, both in the past and the present. The disturbance of these sites continues to be an ongoing injustice to our Indigenous community, the CHamoru People. When cultural artifacts or human remains are disturbed and removed from their immediate location, the whole island community loses tangible connections and direct links to our history, culture, and the ability to learn about how our ancestors lived in that particular area. Artifacts and bones can be lost or broken in the construction process, which can completely upend opportunities to learn more about our history. Oftentimes, these artifacts and burial grounds become completely inaccessible to the public and the local community, and can even remain in federal custody rather than in the hands of Indigenous or local curators, archeologists, historians, or scientists. 	<p>The Draft EIS presents a summary of the potential adverse effects on historic properties. Archeological surveys were conducted of the area of potential effect, and the findings are summarized but the survey reports are omitted due to the sensitive nature of the information they may contain. Adverse effects on cultural resources/historic properties in the area of potential effect will be managed in accordance with the <i>Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation officer regarding Navy Undertakings on the Island of Guam</i>, November 20, 2008 (Appendix C). This Programmatic Agreement "applies to all undertakings initiated within the Navy's area of responsibility, regardless of whether they are initiated, funded, and/or carried out by CNRM (Commander, Navy Region Marianas, now Joint Region Marianas) or by another command or lessee of the Navy. Andersen AFB is currently under Navy joint command. This Programmatic Agreement was developed to outline a streamlined Section 106 compliance process for undertakings described by the Programmatic Agreement.</p>

Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017o	Cultural Resources	<p>Historically, the local community's comprehension of the scope of cultural resource disturbance on military lands has been further obstructed by federal disclosures consistently preventing Guam's State Historic Preservation Office (SHPO) from disseminating federal findings to the public.¹⁵ Ultimately, the cumulative impacts of these projects and all projects concerning the Proposed Action must be fully assessed and disclosed in the Draft EIS for a comprehensive understanding of the scale of disturbance to cultural resources, and to prevent further destruction upon the cultural heritage of the Chamoru People of Guam.</p> <p>All ultimately comprise violations of the CHamoru People's Indigenous Rights to Self-Determination and Free, Prior, and Informed Consent (FPIC) recognized in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Per the United States' 2010 Statement of Support of the UNDRIP, the United States government, including the DoD, has the responsibility to recognize the CHamoru people's rights to self-determination and FPIC regarding the use of CHamoru ancestral lands, territories, and resources. Without prior and proper consultation and consent from the CHamoru people regarding the implementation of the Proposed Action as discussed in the Draft EIS, further pursuit of the Proposed Action comprises a gross violation of the CHamoru people's rights to self-determination and FPIC.</p> <p>[Footnotes] 15 Anumita Kaur, "Preservation Office maintains that it often can't disclose information to public," Pacific Daily News, May 5, 2021.</p>	<p>Your comment has been noted. The important issues of self determination, Chamoru rights, and indigenous rights on Guam are issues beyond the scope of this EIS.</p> <p>The Draft EIS presents a summary of the potential adverse effects on historic properties. Archeological surveys were conducted of the area of potential effect, and the findings are summarized but the survey reports are omitted due to the sensitive nature of the information they may contain. Adverse effects on cultural resources/historic properties in the area of potential effect will be managed in accordance with the <i>Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation officer regarding Navy Undertakings on the Island of Guam</i>, November 20, 2008 (Appendix C). This Programmatic Agreement "applies to all undertakings initiated within the Navy's area of responsibility, regardless of whether they are initiated, funded, and/or carried out by CNRM (Commander, Navy Region Marianas, now Joint Region Marianas) or by another command or lessee of the Navy. Andersen AFB is currently under Navy joint command. This Programmatic Agreement was developed to outline a streamlined Section 106 compliance process for undertakings described by the Programmatic Agreement.</p>
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Duplicate	Sabina Flores Perez	Senator, 37th Guam Legislature	017p	Unsubstantive	It is the opinion of this author that the Draft EIS is gravely insufficient in its research methodology, findings, analysis, and the processes through which DoD engages the CHamoru People and overall island community towards collaborative dialogue. These circumstances only exacerbate existing concerns regarding the adverse impacts that were identified in the Draft EIS, and question the integrity of the magnitude of the Draft EIS's findings and analysis. Comprehensive elaboration and research, along with the full recognition of the CHamoru People's Right to Free, Prior, and Informed Consent (FPIC) and self-determination over their lands, territories, and resources, are critical rights inherent to the People of Guam. As the Proposed Action and its Draft EIS fail to recognize these rights and raise critical concern regarding the scope of analysis provided, I stand in opposition against the Proposed Action and urge for the No Action Alternative.	Thank you for your correspondence. Your comment has been noted. The DAF understands its responsibilities and has the utmost respect for the CHamoru People.
Local Agency	Christopher Budasi	Guam Waterworks Authority	018a	Infrastructure/ Proposed Action	1. The information provided is insufficient to conduct a detailed assessment for the short term and long-term activities associated with proposed F-15 beddown and required infrastructure update due to limited information related to cumulative impact from the various construction activities describe in the Draft Environmental Impact Statement (DEIS) for needed water demand. The DEIS mentions that water will be required from GWA and Andersen AFB. More detail on water demand requirements from GWA is needed.	Information about dust suppression and personal consumption water requirements to support construction is contained in Section 3.9.2.1. Information was added to the Final EIS Section 3.9.2.1 for water required for concrete production.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Christopher Budasi	Guam Waterworks Authority	018b	Infrastructure	<p>2. Certain activities conducted at the utility buildings, munition storage area, the jet fuel systems, storage, hanger, and flightline maintenance facility might be considered high risk and are subject to sewer pre-treatment requirements and will require a Pretreatment Permit for Significant Industrial Users from GWA. The applicant should consult with GWA's Source Control Manager, Melissa Schaible at [redacted] for additional industrial wastewater pre-treatment requirements if any discharge to GWA wastewater collection system is to be made. An application for the Pre-Treatment Industrial user must be completed at least six months prior to GWA accepting any wastewater from these facilities.</p>	<p>Section 3.9.1 of the EIS was updated to include additional permitting information relevant to this Proposed Action. The DAF would comply with all applicable Guam EPA and GWA requirements, including wastewater pre-treatment requirements, and would obtain all necessary permits prior to construction.</p> <p>The proposed stormwater management infrastructure includes detention ponds that would include sand filters and an injection well to help drain the pond within the allotted timeframe and meet recharge volume requirements. Hotspot runoff will be conveyed via impervious, geosynthetic, clay-lined channels to one of three sand filters designated on site, each of which includes a corresponding pretreatment basin and detention pond. The pretreatment basins will serve as fuel spill containment and allow settling for larger particles and debris before allowing the water to discharge off site.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Christopher Budasi	Guam Waterworks Authority	018c	Infrastructure	3. Preventative measures and best management practices must be incorporated into Standard Operating Procedures to ensure that contaminants such as chemicals, oils, and fuel, do not enter into GWA's wastewater collection system. Only wastewater shall be discharged to the sanitary sewer system. Separate oil/water separators will need to be installed at certain facilities where necessary for pretreatment prior to entering the sanitary sewer system. Oil-water separators are required for vehicle wash and maintenance activities.	The DAF would comply with all applicable Guam EPA and GWA requirements. As noted in Section 3.16 of the EIS, the DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage spills or leaks of hazardous materials or wastes. New hazardous materials storage and hazardous waste collection points would be established, as necessary, and the proposed aircraft hangar and maintenance facility would include an oil/water separator.
Duplicate	Christopher Budasi	Guam Waterworks Authority	018d	Infrastructure	4. Stormwater is prohibited from being discharged into GWA's wastewater systems. Ensure that stormwater systems are adequately sized to prevent illicit discharges into GWA's wastewater system. Runoff from the washdown area must not enter GWA's wastewater system. Discharges of storm water or water used for wash downs into the sanitary sewer is prohibited.	The DAF would comply with all applicable Guam EPA and GWA requirements. New stormwater management systems would manage all stormwater runoff and prevent stormwater from entering GWA's wastewater system.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Christopher Budasi	Guam Waterworks Authority	018e	Other	5. GWA request the applicant provide the site development plans for each project for review for the proposed development, especially as such plans relate to the connection to GWA's wastewater collection system and affecting the Northern District Wastewater Treatment Plant. The site development plans must illustrate the proposed point of connection to GWA's facilities which is subject to GWA inspection and approval. Submittals shall include the sewer design calculations and complete drawings and specifications. Design calculations shall include proposed water demand calculations including fire-flow and sewer production calculations.	The DAF would comply with all applicable Guam EPA and GWA requirements. Coordination with GWA would occur during subsequent phases of the project.
Duplicate	Christopher Budasi	Guam Waterworks Authority	018f	Other	6. GWA requires the applicant to coordinate with the GWA Engineering Department to confirm the proposed sewer production calculations are consistent with GWA's wastewater treatment plant capacity and other permitting requirements. Promptly notify GWA Engineering for any increases or changes in sewer production than what is previously reported.	The DAF would comply with all applicable Guam EPA and GWA requirements. Coordination with GWA would occur during subsequent phases of the project.
Duplicate	Christopher Budasi	Guam Waterworks Authority	018g	Other	7. GWA requests the applicant provide detailed information on the potential environmental impacts on biological and cultural resources, water quality, and social resources as analyzed in the Draft EIS. Specific attention should be given to the impacts on groundwater aquifers and surface water quality.	Discussion of impacts on biological and cultural resources, water quality, and socioeconomic resources, including impacts on aquifers and surface water quality from the Proposed Action is included in Section 3 of the EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Kyra Blas	N/A	019a	Military Presence	<p>Background</p> <p>The EIS categorizes comments expressing an opinion against the proposal or any of its aspects, for or against a particular alternative, or a personal preference or opinion as “non-substantive.” Similarly, comments expressing views opposing military on Guam or the Mariana Islands in general are “nonsubstantive.” Thus, they don’t require responses. You should respond. You should communicate to the community why you are discounting our opinions on whether the PA should happen at all, which alternatives are favored or disfavored, and opposition to the increased militarization of our land, our water, our home.</p> <p>This Proposed Action does not occur in a vacuum. It occurs within the broader context of the U.S. government taking and holding onto our people’s lands, increased militarization of the Pacific, and military-fueled gentrification of our homeland. The PA should not only be evaluated for the individualized impacts as laid out in the EIS but also for how it adds to the military’s cumulative adverse impacts on our home and our island’s future.</p>	<p>Thank you for your correspondence. All comments received on the Draft EIS are considered in the decision making process. However, changes to the EIS are considered only for substantive comments. The DAF considers a comment to be substantive if it (1) provides additional or new information that is relevant to the EIS; (2) presents other reasonable alternatives or components to the project, provided that a rational basis for consideration of the alternative or component is included; or (3) questions the accuracy or adequacy of the information presented in the Draft EIS, provided that a rational basis for the question is included.</p>

Duplicate	Kyra Blas	N/A	019b	<p>How did the Air Force even get this land to execute the Proposed Action?</p> <p>Upon obtaining Guåhan as a possession from Spain in 1898, the federal government gained 41,859 acres of Spanish Crown land, over 30% of the entire landmass.¹ Still, the U.S. engaged in further land takings of private property. The most significant and controversial of these takings occurred after World War II. The U.S. government took “for little or no compensation, numerous tracts of real property from private Guamanian landowners for military use.”² To appreciate the grave injustices of these takings, one must understand that our island was still recovering from almost three years of torture, mass executions, sexual assaults, and brutality endured during World War II. On the same day of the attack on Pearl Harbor, Japan’s forces invaded our island. The U.S. military knew this attack was coming and fled, redirecting all their forces to Hawai’i, without warning our people. White military spouses and children were allowed to flee with them, but CHamoru wives and spouses were not.</p> <p>Upon the U.S.’s return, military aerial and naval bombardment and battles decimated entire villages and about 80% of all buildings on the island.³ In some villages, not a single home remained standing.⁴ Still, the CHamoru people were generally grateful to the U.S. for relieving them from the unspeakable acts suffered under the Japanese occupation.</p> <p>Second, the people of Guam were not U.S. citizens, were still living under U.S. military rule, and could not seek equitable judicial recourse.⁵ The Secretary of the Navy appointed the Superior Court of Guam judges.⁶ Appeals of the court’s decision went to the Secretary for final</p>	<p>Thank you for your correspondence. Guam land ownership is beyond the scope of the EIS. Ancestral land ownership and cultural resources that may be present within the project areas are important topics and are discussed in Section 3.5 of the EIS.</p> <p>EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i>, identification of child populations, and impacts on child populations is addressed in Sections 3.12.1.2, 3.12.1.4, and 3.12.2, respectively.</p>
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					<p>rulings.⁷ The people of Guam had no access to an independent judicial system to challenge land takings—"only a court staffed by Naval Officers under the direct command of the same Naval Official acquiring lands to build military bases."⁸ Still, the military used the Fifth Amendment of the U.S. Constitution to justify taking private property for military use. The local community has long questioned the legality and fairness of these conditions.⁹</p> <p>It was in this time of (1) an unfettered military dictatorship and no civil protections on the island and (2) an atmosphere of fear, gratitude, and devastation that the U.S. engaged in the most extensive series of land grabs on the island to date, taking advantage of our traumatized and war-torn people, justified in the name of national security.¹⁰ Some CHamoru people allowed the use of their land to aid the U.S. war efforts, knowing the war continued elsewhere.¹¹ The most common understanding among the CHamoru people was that they were helping U.S. efforts to preserve peace and they would get their land back after the threats had subsided.¹²</p> <p>But as devastating as the loss of so many loved ones was...as much as our people suffered during that time...we do not dwell on it. It is past and nothing can be done to bring them back. And although the losses were great...the events which had the longest and most profound continuous effect upon Guam and the CHamoru people were those that took place in the years immediately after World War II. I speak of the massive taking of land from our people by the U.S. military. – Senator Thomas C. Ada (1993).¹³</p> <p>Many CHamoru people questioned the military land condemnations, takings, and</p>	
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					<p>meager amounts when offered compensation but ultimately acquiesced. Some trusted the U.S. acted in good faith, believed they were contributing to national security, and were grateful for the end of the Japanese occupation.¹⁴ Sadly, some landowners genuinely did not grasp what was happening, and the military did not engage in efforts to ensure the landowners' understanding.¹⁵ Even CHamoru families who did not want to turn over their land struggled to overcome language barriers and had no access to civilian legal assistance.¹⁶ The military claimed as much land as it desired, including areas for exclusive military recreational use, during the end of World War II and through the early development of the Cold War.¹⁷</p> <p>Meanwhile, landowners were not afforded formal procedures or compensation before the takings.¹⁸ By 1947, the military took homes from 1,350 CHamoru families and about 63% of the island's lands—over 79,000 acres—including entire villages and populations, pristine beaches, and over half of the more valuable lands.¹⁹ And many of our people...thousands of them...no longer could walk the land that their parents had always intended they would inherit. – Senator Thomas C. Ada (1993).²⁰</p> <p>The military removed more than 11,000 locals, half of the population, from their ancestral lands all over the island, displacing them from their homes, ranches, ancestral burial grounds, and means of sustenance.²¹ The military destroyed tens of thousands of acres of jungles, took prime fishing and agricultural lands, and forbade landowners from harvesting their ripening crops.²² Anyone who refused to leave their land or tried to return to harvest their crops would have</p>	
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				<p>violated U.S. law and naval security.²³ In some instances, the government forcibly removed landowners.²⁴ By 1950, more than 50% of the lands the military took were inactive military installations.²⁵ Much of this land would remain undeveloped for decades.²⁶</p> <p>At this time, the federal government failed to promise any compensation to the affected landowners.²⁷ Lease payments and compensation made later were meager. Strict military policies created the conditions in which any “fair market” rate attributed to a piece of land was artificially and immensely undervalued, making achieving a fair market rate impossible.²⁸ The military implemented closed border policies, immensely inhibiting free trade and commercial activities and restricting private sector development. They also racially discriminated against local workers in providing fair wages and implemented forced labor policies under threat of fine or imprisonment.²⁹ The market rates were according to the impoverished economy the military themselves created, and the military used these artificially low market values to cheat CHamoru landowners out of just compensation. Compensation averaged about 6% of the land’s independently appraised value.³⁰ Some families remain uncompensated.³¹</p> <p>Though compensation ended at the properties’ alleged values, the takings did not. When the federal government took these lands, they removed people from their means of sustenance, the food that fed their families, and the very soil that ensured their survival and the survival of future generations. The military took an entire way of life.</p> <p>Regardless of whether the land takings were conducted with callous intent or</p>	
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					<p>simply the result of a colonial bureaucratic mind-set, the outcome remains the same; the economic and social displacement of a native people within their own homeland. – Senator Thomas C. Ada (1993).³²</p> <p>Between 1950 and 1991, the U.S. condemned more land at least once. Now, the military retains control over 35,000 acres of land on Guam, nearly 30% of the island’s land mass. Our local government and our people have sought the return of these lands for generations, and this continues today.</p> <p>The current Proposed Action continues this painful and violent legacy. I share this information because how the Air Force came into possession of this land matters. How the Air Force uses and treats this land matters. The fight to return these lands is, still ongoing and the condition of the land when the U.S. returns it matters.</p> <p>[Footnotes]</p> <p>1 Gov’t of Guam ex rel. Guam Econ. Dev. Auth. v. United States, 179 F.3d 630, 631–32 (9th Cir. 1999), as amended on denial of reh’g (Aug. 12, 1999).</p> <p>2 Crawford v. Antonio B. Won Pat Int’l Airport Auth., 917 F.3d 1081, 1085 (9th Cir. 2019).</p> <p>3 Kelly Marsh-Taitano, The Fight to Keep Tumon Public, Guampedia (Nov. 29, 2022), https://www.guampedia.com/the-fight-to-keep-tumon-public/; Frank Quimby, National Attention on Guam’s Postwar Campaign for Citizenship, Guampedia (Dec. 19, 2022), https://www.guampedia.com/national-attention-on-guams-postwar-campaign-for-citizenship/.</p> <p>4 Frank Quimby, National Attention on Guam’s Postwar Campaign for Citizenship, Guampedia (Dec. 19, 2022),</p>
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					<p>https://www.guampedia.com/national-attention-on-guams-postwar-campaign-for-citizenship/.</p> <p>5 The closest semblance of self-governance at the time was the Guam Congress, which functioned merely as an advisory council to the Naval Governor. Id.</p> <p>6 Kelly Marsh-Taitano, The Fight to Keep Tumon Public, Guampedia (Nov. 29, 2022), https://www.guampedia.com/the-fight-to-keep-tumon-public/.</p> <p>7 Id.</p> <p>8 An Act to Add Chapter 80 to Title 21, to Amend § 2927 and Add §§ 2926(c) and 2946 to Title 12, and to Amend § 75104(b) of Chapter 75 of Title 21, All of the Guam Code Annotated, Relative to Creating the Guam Ancestral Lands Commission, and for Land Claims and Landowners' Recovery, Guam Pub. L. No. 25-45 (1999).</p> <p>9 Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Sen. Thomas C. Ada).</p> <p>10 Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Del. Robert A. Underwood).</p> <p>11 Id.</p> <p>12 Id.</p> <p>13 Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Hon. Frank F. Blas).</p> <p>14 Transfer of Excess Lands to the Government of Guam: Hearing on H.R.</p>	
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					<p>2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Del. Robert A. Underwood).</p> <p>15 Id.</p> <p>16 Id.</p> <p>17 Frank Quimby, National Attention on Guam’s Postwar Campaign for Citizenship, Guampedia (Dec. 19, 2022), https://www.guampedia.com/national-attention-on-guams-postwar-campaign-for-citizenship/.</p> <p>18 Id.</p> <p>19 Kelly Marsh-Taitano, The Fight to Keep Tumon Public, Guampedia (Nov. 29, 2022), https://www.guampedia.com/the-fight-to-keep-tumon-public/.; Frank Quimby, National Attention on Guam’s Postwar Campaign for Citizenship, Guampedia (Dec. 19, 2022), https://www.guampedia.com/national-attention-on-guams-postwar-campaign-for-citizenship/.; Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Hon. Frank F. Blas).</p> <p>20 Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Hon. Frank F. Blas).</p> <p>21 Kelly Marsh-Taitano, The Fight to Keep Tumon Public, Guampedia (Nov. 29, 2022), https://www.guampedia.com/the-fight-to-keep-tumon-public/; Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Hon. Frank F. Blas) (“The takings were almost universal. Prior to World War II,</p>	
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					<p>Guam was an agrarian economy and most land belonged to private CHamoru landowners.”); Frank Quimby, National Attention on Guam’s Postwar Campaign for Citizenship, Guampedia (Dec. 19, 2022), https://www.guampedia.com/national-attention-on-guams-postwar-campaign-for-citizenship/.</p> <p>22 Id.; Speaker Arriola – Land Condemnations, Security, Guampedia (Aug. 2022), https://vimeo.com/738827514.</p> <p>23 Kelly Marsh-Taitano, The Fight to Keep Tumon Public, Guampedia (Nov. 29, 2022), https://www.guampedia.com/the-fight-to-keep-tumon-public/; Frank Quimby, National Attention on Guam’s Postwar Campaign for Citizenship, Guampedia (Dec. 19, 2022), https://www.guampedia.com/national-attention-on-guams-postwar-campaign-for-citizenship/.</p> <p>24 Id.</p> <p>25 See Civil Gov’t of Guam: Hearing on S. 185, S. 1892 & H.R. 7273 Before a Senate Subcomm. of the Comm. on Interior and Insular Affairs, 81st Cong. 62, 2d Sess. (Apr. 19, 1950).</p> <p>26 Frank Quimby, National Attention on Guam’s Postwar Campaign for Citizenship, Guampedia (Dec. 19, 2022), https://www.guampedia.com/national-attention-on-guams-postwar-campaign-for-citizenship/.</p> <p>27 Id.</p> <p>28 Id. (“[T]he island was a restricted military area closed to outside investment and development, which abnormally depressed land values.”).</p> <p>29 Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular</p>	
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>and International Affairs, 103rd Cong. (1993) (statement of Sen. Thomas C. Ada).</p> <p>30 Kelly Marsh-Taitano, The Fight to Keep Tumon Public, Guampedia (Nov. 29, 2022), https://www.guampedia.com/the-fight-to-keep-tumon-public/.</p> <p>31 An Act to Add Chapter 80 to Title 21, to Amend § 2927 and Add §§ 2926(c) and 2946 to Title 12, and to Amend § 75104(b) of Chapter 75 of Title 21, All of the Guam Code Annotated, Relative to Creating the Guam Ancestral Lands Commission, and for Land Claims and Landowners' Recovery, Guam Pub. L. No. 25-45 (1999); Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Del. Robert A. Underwood).</p> <p>32 Transfer of Excess Lands to the Government of Guam: Hearing on H.R. 2144 Before the H. Subcomm. on Insular and International Affairs, 103rd Cong. (1993) (statement of Sen. Thomas C. Ada).</p>	

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019c	North Ramp	<p>The Proposed Action: Questions and Recommendations.</p> <p>Below are questions and recommendations regarding the proposed action.</p> <p>1. Jet Fuel Receipt, Storage, and Distribution System Extension; Petroleum, Oil, and Lubricants Storage.</p> <p>a. The EIS mentions a fuel leak detection system. What is the system called, and who produced it? How does the system compare to other systems at military installations where fuel leaks have occurred, including Guam and Red Hill? How and how often will the system be maintained and tested to ensure it works? Will it be upgraded? Do all other sources, storage, or transports of fuel and other hazardous wastes on Guam have updated leak detection systems? If not, what leak detection systems do they have?</p>	All proposed infrastructure including extending the existing fuel system to the new parking apron would be designed, built and operated to the most up to date standards. The EIS does not include an assessment of the existing fuels infrastructure on Andersen AFB.
Duplicate	Kyra Blas	N/A	019d	North Ramp	<p>b. What procedures will you follow if a leak occurs? How soon will you inform the public, and in what ways? How will you ensure the public knows of any leak as quickly as possible?</p>	The DAF would amend the Andersen AFB Spill Prevention, Control, and Countermeasures (SPCC) Plan or develop a site-specific SPCC Plan, as required by Section 311(j)(1)(C) of the Clean Water Act (CWA; as amended by the Oil Pollution Act of 1990), 40 CFR 112, Oil Pollution Prevention, and DAFI 32-7044, Storage Tank Environmental Compliance, to manage accidental spills or leaks of hazardous materials or wastes.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019e	Water Resources	c. If a leak occurs, how will you ensure our water sources, including the Northern Guam Lens Aquifer, surrounding ocean, and other waters, are not contaminated? How will you ensure any contamination is minimal? How will you clean up these sources? How will you ensure this cleanup happens as swiftly as possible? Do you have resources (including financial) to follow through with the cleanup?	The EIS acknowledges potential impacts and notes that construction of stormwater management infrastructure to minimize impacts are described in Section 2.1.2.1.7. The DAF would amend the Andersen AFB Spill Prevention, Control, and Countermeasures (SPCC) Plan or develop a site-specific SPCC Plan, as required by Section 311(j)(1)(C) of the Clean Water Act (CWA; as amended by the Oil Pollution Act of 1990), 40 CFR 112, Oil Pollution Prevention, and DAFI 32-7044, Storage Tank Environmental Compliance, to manage accidental spills or leaks of hazardous materials or wastes.
Duplicate	Kyra Blas	N/A	019f	Water Resources/ Mitigation	d. If a leak occurs, what commitment will you make to provide clean, potable water to the local community? How can the public hold you accountable for those commitment(s)?	Leak detection systems would be added to all new fuels and infrastructure. Potential leaks would be managed to prevent contamination to the water system.
Duplicate	Kyra Blas	N/A	019g	Geological Resources/ Mitigation	e. If a leak occurs, what will the cleanup procedure be for contaminated land resources (e.g., soils)? If the military removes the soil, what will you do with it after removal, and how will the DAF replace the removed soil and prevent erosion?	The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage accidental spills or leaks. Contaminated soils will be managed in accordance with applicable federal and Guam regulations in place at the time of any unforeseen accidental leak should one occur.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019h	Mitigation	f. How can the public ensure the DAF and its partners follow all proper procedures during the construction and implementation of the Proposed Action? What accountability measures will be available? How will the DAF and its partners ensure transparency regarding the procedures and how/that they follow them?	All DAF construction contractors are required by contract terms to comply with applicable rules, regulations, and requirements including environmental requirements outlined in the EIS.
Duplicate	Kyra Blas	N/A	019i	Infrastructure	g. The EIS states: Aviation fuel is transported to Andersen AFB via pipeline from the Naval Defense Fuel Support Point (DFSP) Guam facility at the Navy port facility at Apra Harbor. A new 15.7-mile pipeline from the DFSP was completed in 2018, effectively doubling pipeline throughput to Andersen AFB to more than 4 mgd. Fuel storage capacity is approximately 66 million gallons. How many times has this pipeline leaked? How is it maintained? What accountability measures are available to the community in case of a pipeline leak? Who constructed this pipeline? Who is responsible for its maintenance?	Records for the existing pipeline, which is not part of the Proposed Action being analyzed in the EIS, are available for review through Guam EPA.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019j	North Ramp	h. Has the military fortified these systems, the 200-gallon diesel storage tank mentioned in the EIS, and any other things used for the storage, transport, or distribution of jet fuel, petroleum, oil, or other hazardous materials to withstand typhoons, especially as they increase with frequency and intensity due to the climate crisis.	To reduce the likelihood of spills during construction and operation of new fuels related infrastructure, as well as the impact of spills in the unlikely event that one should occur, all proposed fuels infrastructure would be designed and constructed according to the applicable federal and Guam requirements, including UFC 3-460-01 Petroleum Fuel Facilities, and applicable sections of the Pipeline Hazardous Materials Safety Administration's (PHMSA) pipeline safety regulations specified in 49 CFR § 195 Transportation of Hazardous Liquids by Pipeline as referenced in UFC 3-460-01 and related to mechanical design and construction. As stated in UFC 3-460-01, it is the firm policy of the DOD to design and construct fueling facilities in a manner that will prevent damage to the environment by accidental discharge of fuels, their vapors or residues. Fuel related facilities would also be constructed in accordance with seismic and tropical requirements, including those for seismic and wind loads outlined in American Society of Civil Engineers Standard 7-10 Minimum Design Loads for Buildings and Other Structures, UFC 3-310-04 Seismic Design for Buildings, UFC 3-301-01 Structural Engineering, and UFC 3-440-05N Tropical Engineering.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019k	North Ramp	i. Recommendations: The DAF should maintain the pipelines, storage, systems, and any other fuel-related or hazardous-waste related technologies daily. The DAF should be able to know immediately if there are any leaks. Then, the DAF should immediately inform the public of any leaks through multiple medias, including local papers and news outlets, social media, radio, publicly posted signs, by contacting residents and local community and government organizations directly, and any other effective means of communication. The military should be investing in upgrading leak detection systems and replacing them as soon as upgrades are available,	The hydrant system fueling loop and fuel transfer pipeline that would be installed at the North Ramp would be fitted with leak detection technology that would notify the operator of a spill or leak. The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage accidental spills or leaks. Impacts from hazardous materials and wastes, including potential fuel spills and leaks, are discussed in Section 3.16.2 of the EIS.

Duplicate	Kyra Blas	N/A	019I	Water Resources/ Mitigation	<p>2. Effects on the Northern Guam Lens Aquifer and Other Waters.</p> <p>a. The EIS states: Groundwater could also be affected from accidental spills or leaks of fuel, lubricants, or coolant from equipment or infrastructure.</p> <p>The proposed fuel infrastructure could leak, resulting in impacts on health and safety as well as water quality if the leak affects groundwater.</p> <p>Pollution from stormwater runoff could contribute to groundwater impacts on groundwater resources through percolation. Impacts on groundwater resources could also result from a reduction in groundwater recharge associated with the construction of approximately 80 acres of impervious surfaces and increased evapotranspiration.</p> <p>Stormwater generated during construction may contain elevated sediment concentrations from excavation as well as hazardous materials from spills and leaks of lubricants, fuels, or other chemicals. Due to the high permeability of the limestone underlying Andersen AFB, the aquifer could be susceptible to contamination.</p> <p>Adverse impacts on surface waters could result from North Ramp construction. Impacts on surface water resources could result from degraded water quality, increased stormwater runoff, and altered hydrologic conditions. Construction activities such as trenching and excavating would displace soils and sediment. If not managed properly, disturbed soils and sediments could be washed into nearby sinkholes or depressions, and could enter groundwater</p>	<p>DAF will manage all construction and stormwater in accordance with all applicable requirements as outlined in the EIS. The Proposed Action also incorporates advanced stormwater controls as part of the overall project design that were developed in cooperation with Guam EPA, which includes stormwater collection, filtration, and managed release of the stormwater into the ground.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>or surface waters during storm events and reduce water quality.</p> <p>Significant but mitigable, short-term, localized, cumulative impacts on potable water would also be expected.</p> <p>What will the military do to actively prevent any adverse impacts on our waters? What corrective actions will be taken if any adverse impacts occur? How can this information and these commitments be made available to the public? How can the public ensure the military follows through on these commitments?</p>	
Duplicate	Kyra Blas	N/A	019m	North Ramp	<p>b. Recommendations: The military should have independent experts, scientists, and credible representatives from the local community design and oversee stormwater infrastructure, construction processes, storage design, and any other operations that could adversely affect our waters. The military should make a binding and legally actionable contract with the Government of Guam and interested community organizations with a clause allowing for citizen suits in the event these commitments are broken. If the groundwater water supply, aquifer, ocean, or any other water source is contaminated, the military should immediately inform the public as described in the recommendations for Question 1. If the aquifer or groundwater systems are contaminated, the military should further provide free potable water to meet the needs of everyone in the community until independent scientists, trusted by and in conversation with the local community, confirm the water is no longer dangerous.</p>	<p>DAF has worked with Guam EPA to design appropriate stormwater control features that will be integrated in the overall project design.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019n	Proposed Action	3. Impacts on the Local Housing Market a. The Proposed Action involves relocating 240 military personnel and their associated dependents to Guam. The EIS acknowledges that this will add stress to the off-installation housing demand on Guam and would add to the local demand for utilities, potable water, and reliance on emergency services. Why can't these additional military personnel live on base?	The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of local housing affordability from the Joint Region Marianas 2024 Housing Requirements Market Analysis. There is not sufficient base housing to support additional personnel.
Duplicate	Kyra Blas	N/A	019o	Socioeconomics	b. The extremely high overseas housing allowance has long been affording military servicemembers luxurious living on this island. Now, combined with the military build-up and even more personnel associated with the F-15 beddown stationed here, your housing allowances are saturating the market and driving up rents. These increased rents make it increasingly difficult and, in many cases, impossible for locals to participate in the housing market. In the states, the Basic Allowance for Housing is based on market rents, taking into account comparable civilian housing, and specifically designed so as not to disturb the housing market the way the military has affected the housing market here. How is the military planning on adjusting the housing allowance to allow civilians here the same consideration afforded to state residents?	The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019p	Socioeconomics	c. How is the military planning to incentivize servicemembers to live on base, rather than off-installation?	Housing availability on Andersen AFB is limited. The DAF recognizes the negative effects of military housing needs on the local housing market. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.
Duplicate	Kyra Blas	N/A	019q	Socioeconomics	d. What is the military doing to educate servicemembers on their role in gentrifying our island and pushing locals and Indigenous CHamoru people off the island out of financial need?	Housing availability and affordability as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.
Duplicate	Kyra Blas	N/A	019r	Socioeconomics	e. Suppose there is not enough housing to accommodate all, the vast majority, or a substantial amount of military personnel on base. What is the military's plan to decrease the number of personnel stationed here? Alternatively, what is the military's plan to accommodate more personnel housing on base?	Housing availability and affordability as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The DAF's Proposed Action analyzed in this EIS is separate from the Guam and CNMI military relocation and the island-wide housing issues are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. Sections 3.6.1 and 3.6.2 have been updated with additional information from the Joint Region Marianas 2024 Housing Requirements Market Analysis.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019s	Socioeconomics/ Mitigation	f. What is the military’s plan to offset the ongoing, adverse housing-related impacts on the local community?	The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 2.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019t	Socioeconomics/ Mitigation	g. Recommendations: The military should decrease the housing allowance from a base minimum of \$1000 and then increase the allowance with rank and number of dependents. The military should switch Guam from the Overseas Housing Allowance to the Basic Allowance for Housing. The military should survey military personnel about what might incentivize them to stay on base and then offer those incentives to personnel. Alternatively, the military should require personnel to stay on base until all housing units are occupied and then decrease the number of overall personnel stationed here or explore options to expand on-base housing. The military should educate their personnel on how their housing decisions gentrify our island and impact our local community.	The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019u	Infrastructure/ Mitigation	4. Infrastructure a. What is the military's plan to offset its ongoing, adverse impacts on available utilities and local infrastructure, such as increased wear on off-installation roads, increased demand on our power grid, which already suffers from power outages, increased sewage, increased trash, and increased water demands that may overdraw from and threaten our sole source aquifer?	Increases in utility demand from the Proposed Action are addressed in Section 3.9 of the EIS.
Duplicate	Kyra Blas	N/A	019v	Infrastructure	b. What is the military's plan for if, because of the increase in military personnel and construction, sewage overflows, the aquifer is overdrawn, or any other adverse impacts happen to our local infrastructure?	Increases in potable water demand and water discharge demand from the Proposed Action are addressed in Sections 3.8 and 3.9. Utility demand as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.
Duplicate	Kyra Blas	N/A	019w	Infrastructure	c. The construction and increased personnel associated with the Proposed Action will further adversely affect the quality of our roads. There are no street-sweepers here. If the construction or military vehicles leave debris in the streets, will the military remove them?	Thank you for your comment. DoD contractors who are involved in transportation of materials on local streets would be responsible for not leaving material in the street and would retrieve any material that incidentally falls off transport vehicles like any other road users.
Duplicate	Kyra Blas	N/A	019x	Infrastructure/ Mitigation	d. How does the military plan to safely and efficiently improve the island's infrastructure to support its increased use and personnel?	Increases in utility demand from the Proposed Action alone are addressed in Section 3.9 of the EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019y	Infrastructure/ Mitigation	e. The Proposed Action mentions that utilities, including electricity, communication, water, and sewer lines, will be installed above or below ground. How will this affect our existing power grid (considering that we already have load shedding/frequent power outages), water supply, communication towers (affecting our phones, service, and internet), and sewer system? How does the military plan to offset these adverse impacts?	Impacts on local utility demand from the Proposed Action are discussed in Section 3.9.2 of the EIS.
Duplicate	Kyra Blas	N/A	019z	HazMat/ Infrastructure	f. How will the military contain and dispose of hazardous waste?	The management of hazardous wastes is discussed in Section 3.16.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019aa	Proposed Action/ Mitigation	g. Recommendations: The military should decrease the number of personnel and construction workers coming here for the Proposed Action. The military should pay to fix and expand the island's infrastructure. The military should ensure that the aquifer, other waters, and lands are never threatened by its activities (e.g., by sewage overflow or aquifer overextraction) and take every precautionary measure possible. In the event there are actualized adverse effects, the military should completely and efficiently remediate these adverse effects. These commitments should be enshrined in an actionable contract as described in the recommendations for Question 2.	Changes to the predicted population levels from overall military buildup, island-wide utility demand, and island-wide infrastructure needs are beyond the scope of this EIS. Island-wide population, utility demand, and infrastructure needs as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. Utility demand, infrastructure needs, The DAF's Proposed Action analyzed in this EIS is separate from the Guam and CNMI military relocation and the island-wide housing issues are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. Sections 3.6.1 and 3.6.2 have been updated with additional information from the Joint Region Marianas 2024 Housing Requirements Market Analysis.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019ab	Public Safety	<p>5. Social Impacts on the Local Community from Increased Military Personnel. The following questions pertain to increased personnel stationed here and further increases during the biannual exercises because of the Proposed Action.</p> <p>a. (CW: sexual assault). Statistics and data on sexual assault and gendered violence on Guam are severely lacking. While we do not know how much Air Force personnel are responsible for gendered violence against women and girls on the island, according to the Guam Naval Fleet and Family Services Unit, the arrival of submarines and naval ships on the island corresponds to dramatic increases in sexual assault and possible trafficking violations. Further, U.S. soldiers generally are often customers for brothels masquerading as massage parlors, especially in Tumon, contributing to the human trafficking epidemic here. What is the DAF doing to educate its personnel, prevent instances of gendered violence, and hold assailants accountable? What accountability mechanisms are accessible to the local community? How effective are these mechanisms, and how do you measure their effectiveness? How is the DAF going to collect data on military-related gendered violence, trafficking, and sexual assault/violence and share them with the public?</p>	<p>The Republic of Singapore Air Force (RSAF) has been training with F-15 fighter jets at Mountain Home Air Force Base in Idaho for 15 years with no reported increased crime rates. Any RSAF personnel would be subject to the same laws and standards of public conduct as all other people in Guam. Like civilians, all military personnel are required to follow federal, state, and local laws, as well as military laws. If an individual violates any law, they are subject to legal consequences that may include fines, imprisonment, or other penalties determined by the judicial system.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019ac	Other	b. Marines have informed me that they are not allowed to frequent certain establishments on Guam (such as the nightclub, the W) but do anyway. Are DAF personnel restricted similarly, and if so, for what establishments or areas? If locals find them frequenting these areas, what steps can we take to report them or otherwise hold them accountable?	Like civilians, all military personnel are required to follow federal, state, and local laws, as well as military laws. If an individual violates any law, they are subject to legal consequences that may include fines, imprisonment, or other penalties determined by the judicial system.
Duplicate	Kyra Blas	N/A	019ad	Recreation	c. Unlike locals, the military can go to any beach or recreational area on the island. Military personnel overcrowd our publicly accessible beaches and leave their beer cans and other trash behind, polluting our ocean and littering over public parks, areas, and sands. The increased personnel threatens to worsen this already worsening problem. What is the military doing to hold them accountable or educate them on how to treat our island and community respectfully? How can the local community hold them accountable?	Like civilians, military personnel are required to follow the specific Guam laws prohibiting littering in public spaces and are subject to legal consequences, including fines, if those laws are violated. Although not anticipated for this action, contact Andersen Air Force Base Public Affairs if you observe questionable behavior. Their contact information can be found at the following web link: https://www.andersen.af.mil/Units/Wing-Staff-Agencies/Public-Affairs/
Duplicate	Kyra Blas	N/A	019ae	Other/ Mitigation	d. Recommendations: The military should compile and make publicly available data and statistics on military personnel's sexual, physical, and gendered violence. The data should be disaggregated multiple ways, including disaggregating data when the victims are locals or CHamoru. The military should make publicly available what places its personnel are not supposed to frequent. The military should also publicize a hotline locals can call or text to report when military are violating those directives. The military should partner with members of the local community and government to develop and establish an educational program to address these issues.	DAF acknowledges your comment. Information may be available by contacting the Andersen Air Force Base Sexual Assault Response Coordinator (SARC) by using information at the following web link: https://www.andersen.af.mil/SARC/

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019af	Biological Resources	6. Forest Demolition a. According to the EIS, the military plans to demolish 150.7 acres of vegetation and wildlife habitat and disturb ground and soils for construction associated with the Proposed Action. How does the military plan to contain the spread of invasive species during and after demolition?	Additional information on invasive species, their impacts, and management measures have been included in Section 3.4.1.4.
Duplicate	Kyra Blas	N/A	019ag	Biological Resources	b. According to the EIS, the military plans to replant some trees. Because trees can take many years to grow, is the military proactively planting trees to account for future plans, including this Proposed Action?	Conservation measures to offset impacts from the Proposed Action were developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures include development of a habitat enhancement area. All conservation measures developed in consultation with USFWS are detailed in the Biological Opinion, which is included in Appendix B.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019ah	Biological Resources	c. According to the EIS, the long-term and permanent loss of vegetation and soil to impervious surfaces would have irreversible and irretrievable impacts on natural resources. Further, “[t]he reduction in vegetation and increase in impervious surface associated with construction has the potential to affect overland water flow and recharge of the local aquifer. Clearing vegetation, soil compaction, and impervious surface would reduce infiltration and percolation of water to the groundwater lens by removing vegetation and natural depressions that might serve to pond stormwater and promote recharge to the aquifer.” How is the military planning to offset these adverse impacts? How will the military measure the effectiveness of these plans? How will the public know the military’s offset measures, whether they are effective, and how to provide further input?	Conservation measures to offset impacts from the Proposed Action have been developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures include development of a habitat enhancement area. All conservation measures developed in consultation with USFWS are detailed in the Biological Opinion, which is included in Appendix B.
Duplicate	Kyra Blas	N/A	019ai	Geological Resources	d. How is the military planning to prevent erosion caused by the demolition of these trees and other activities associated with the Proposed Action?	Impacts from erosion and sedimentation are addressed in Section 3.8.2 of the EIS. The DAF would implement the site-specific erosion and sediment controls identified in the USEPA NPDES CGP to manage stormwater runoff and soil disturbance.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019aj	Proposed Action	e. Recommendations: The military should work with local scientists and conservationists on how to best prevent erosion and limit the destructive adverse impacts associated with the Proposed Action. The procedures and evidence of follow-through should be made publicly available. The military should sign a binding, actionable contract similar to the one described in the recommendations for Question 2.	Impacts from erosion and sedimentation are addressed in Section 3.8.2 of the EIS. The DAF would implement the site-specific erosion and sediment controls identified in the USEPA NPDES CGP to manage stormwater runoff and soil disturbance. Site-specific erosion control plans would be publicly available and provided upon request.
Duplicate	Kyra Blas	N/A	019ak	Noise/Mitigation	7. Training Flights a. Some flights will be conducted from 10 p.m. until 7 a.m. Additionally, it is estimated that each sortie will take approximately 2 hours. How will the military compensate for or otherwise offset any adverse effects (e.g., sleep disturbance) on the local community and wildlife?	During each sortie, aircraft arriving and departing would only be audible for a few minutes while near the base. The DAF primary noise reduction strategy is implementing flight protocols and practices, and the tracking of noise complaints and resolution. The primary protocol/ to reduce noise at the base is to execute the majority of take-off and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and will be the standard practice for the proposed F-15s. Architectural upgrades and other noise reduction elements have not been carried forward as an additional mitigation measure in the Final EIS or ROD.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019al	F-15 Beddown/ Water Resources	b. The EIS shows that the military may leave munitions expended during training flights in the Pacific Ocean. Is this correct? Is the military knowingly polluting the ocean and endangering wildlife by causing munitions to enter and settle into the ocean? Are there other aspects of these munitions that may further pollute or endanger wildlife or local communities? Will these munitions leach hazardous chemicals into our waters? Are there any lines or dangerous aspects to these munitions that could further jeopardize wildlife, including endangered species?	This EIS addresses only the ground movements as well as immediate approaches and departures at the airfield (e.g., take-offs, landings) during training exercises and military operations. All F-15 training flight, supporting aircraft flight operations, and munitions expenditures would occur within the Mariana Islands Range Complex (MIRC). Impacts from training and munitions expenditures in the MIRC are addressed in the MIRC EIS, MITT EIS, and MITT Supplemental EIS. Training operations included in the Proposed Action would be consistent with types of operations currently occurring at the installation, which were analyzed in these documents.
Duplicate	Kyra Blas	N/A	019am	F-15 Beddown/ Public Safety	c. It's possible that aircraft, munitions, or other military equipment/technology malfunction or military personnel misuse or otherwise make mistakes during these training flights. Is there any possibility that these mishaps could harm members of the local community, wildlife, or non-military-owned property? If so, what commitments is the military making to correct or compensate for any damage or harm? How can affected victims or advocates hold the military accountable to follow through on these commitments?	Analysis of mishaps during training exercises in the MIRC was included in the MIRC EIS and related impacts were determined to be less than significant. Analysis from the MIRC EIS is incorporated by reference in the EIS. Training operations included in the Proposed Action would be consistent with types of operations currently occurring at the installation, which were analyzed in MIRC EIS, MITT EIS, and the MITT Supplemental EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019an	F-15 Beddown	d. Recommendations: The military should not leave any munitions in the ocean. The military should not perform any loud tests or operations that will disturb the local community, especially school children on school nights. The military should enter into a binding contract for any damage caused by these operations in a similar fashion described in Question 2.	Analysis of munitions expenditures in the MIRC was included in the MIRC EIS and related impacts were determined to be less than significant. Analysis from the MIRC EIS is incorporated by reference in this EIS. Impacts on the local community from noise is addressed in Section 3.10.2 of the EIS. All operations would follow federal, Guam, local, and military regulations. EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i> , identification of child populations, and impacts on child populations is addressed in Sections 3.12.1.2, 3.12.1.4, and 3.12.2, respectively.
Duplicate	Kyra Blas	N/A	019ao	HazMat	8. Unexploded Ordnance (UXO) a. If UXO is found during construction, operation, or any other events associated with the Proposed Action, what is the military's procedure for disposal or removal?	Section 3.16.1.2 states that unexploded ordnance (UXO) is a type of munitions and explosives of concern (MEC). Procedures for the disposal and removal of discovered MEC are described in Section 3.16.2.1. Text states, "MEC would be collected and disposed in accordance with federal and installation regulations by trained and certified personnel."
Duplicate	Kyra Blas	N/A	019ap	HazMat	b. Recommendations: The military should cease open burn/open detonation as a way to dispose of UXO. The military should use closed chambers to prevent the emission of hazardous chemicals into our environment.	Changes to MEC (which includes UXO) disposal practices are beyond the scope of this EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019aq	Cultural Resources	9. Ancestral Remains and Other Cultural Artifacts and Resources a. If ancestral remains or other artifacts found during construction, operation, or other instances connected to the Proposed Action, what process does the military follow?	As discussed in Section 3.5.2, the potential for unidentified cultural resources to be discovered during construction of the North Ramp is low. Inadvertent discoveries of artifacts may be possible in the MSA-1 APE within Site 66-08-2981. However, should inadvertent discoveries be made, the standard procedures outlined in the Andersen AFB Integrated Cultural Resources Management Plan would be followed. In the event of post-review discoveries, the DAF would comply with 36 CFR 800.13. The Andersen AFB Integrated Cultural Resources Management Plan includes a standard operating procedure for Inadvertent Discovery of Human Remains that closely aligns with the requirements of the Native American Graves Protection and Repatriation Act.
Duplicate	Kyra Blas	N/A	019ar	Cultural Resources	b. The EIS notes that human remains were found at the MSA-1 project area and are now in DAF custody at AAFB. What does this mean? How are these remains being stored? What will happen to them?	All remains are required to be handled consistent with Archeological Resource Protection Act regulations.
Duplicate	Kyra Blas	N/A	019as	Cultural Resources	c. Recommendations: The military should cease construction in any area where cultural artifacts and ancestral remains are found. The military should consult with cultural leaders and experts on how best to proceed after any of these are found. The military should make these artifacts and areas publicly accessible.	In the event of inadvertent discovery of cultural artifacts or human remains, the operating procedures in the Andersen AFB Integrated Cultural Resources Management Plan would be followed.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019at	MSA-1	<p>10. Munitions Storage</p> <p>a. What kinds of munitions will be stored? Are any of them nuclear weapons? What safety measures, precautions, and procedures are followed related to munitions storage? How will the military share this information with the local community (as it affects our safety)? How can the military ensure the local community is aware of these measures and prove that they are being followed? How can the local community hold the military accountable for any lapses in safety?</p>	<p>Munitions storage procedures as they relate to safety are discussed in Section 3.12 of the EIS. As noted in Section 3.10.1, the ESQD arc associated with munitions storage at MSA-1 does not extend beyond the Anderson AFB boundary; therefore, there are safety hazards related to munitions storage within the local community. The DAF follows all DoD and federal regulations for the safe handling and storage of all munitions.</p>
Duplicate	Kyra Blas	N/A	019au	Air Quality/ Mitigation	<p>11. Climate Change</p> <p>a. The emissions, destruction of forest, increased flight tests, increased personnel, and other aspects of the Proposed Action will increase air emissions, increase use of fossil fuels, and worsen the climate crisis. How is the military planning to contribute to the protection of our island against the worsening climate crisis and its affects? How is the military planning to reduce this Proposed Action's contributions to the climate crisis?</p>	<p>GHG emissions from the proposed action are outlined in Section 3.11.2.1 of the EIS. This EIS examines GHGs as a category of air emissions. However, global and regional weather stressor models have substantial variation in output, and do not have the ability to measure the actual incremental impacts of a project on the environment; therefore, no mitigation measures have been included in the Final EIS or recommended for the ROD.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019av	Air Quality / Mitigation	b. Recommendations: The military should invest in more true renewable energy solutions, like solar and wind power, rather than investing billions in fossil fuels. The military should lessen the frequency of flight tests, such as every two years, rather than twice a year. The military should reduce the number of military personnel on island. The military should not demolish any more trees and should execute alternatives.	The establishment of renewable energy sources on Guam is beyond the scope of this EIS. Conducting exercises every two years rather than up to two times per year does not meet the mission of the DAF or partner nation forces and would not be considered a viable alternative to the Proposed Action. Changes to the predicted military population level from overall military buildup are beyond the scope of this EIS. Impacts on vegetation, including from demolition of trees, is addressed in Section 3.4.2 of the EIS.
Duplicate	Kyra Blas	N/A	019aw	Biological Resources/ Mitigation	12. Special Status Species a. The EIS states that significant adverse effects on special status species would be minimized through the implementation of conservation measures identified through consultation with the USFWS. The Proposed Action includes land on AAFB not technically set aside for the Guam Micronesia Kingfisher, but the proposed land is immediately next to land that has been site aside on 2-3 sides. Will USFWS be making an independent recommendation for conservation measures? If so, will that be made publicly available? Will the DAF make the conservation measures identified through its consultation with the USFWS publicly available? Will there be any mechanisms in place for legally actionable or other forms of accountability? How will the public know the DAF is consistently implementing the conservation measures?	The conservation measures are detailed in the Biological Opinion, which is included in Appendix B. The incidental take statement in the biological opinion includes an annual reporting requirement.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Kyra Blas	N/A	019ax	Biological Resources	b. Recommendations: The USFWS should make a publicly available independent assessment. The DAF should make the conservation measures it intends to follow publicly available. Evidence of compliance should be made publicly available. If the military fails to comply, the public, the Government of Guam, and any other concerned organization or individual should be able to sue the military for that lack of compliance and to ensure future compliance.	The conservation measures are detailed in the Biological Opinion, which is included in Appendix B. The incidental take statement in the biological opinion includes an annual reporting requirement.
Local Agency	Judith T. Won Pat	Chief Advisor on Education, Office of the Governor of Guam	020	N/A	Comment 020 (submitted via email) is identical to Comment 016 (submitted via web comment form).	See response to Comment 016.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Julia Faye Munoz	N/A	021a	Biological Resources/ HazMat	<p>I oppose the Proposed Action stated in the Draft Environmental Impact Statement (EIS) for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base (AFB), Guam. According to the Draft EIS, the Proposed Action will result in extremely alarming adverse impacts environmentally, socioeconomically, and culturally. Concerning the environment, 150.7 forested acres will be destroyed and render the Vitex Forest unsuitable to support native species; aircraft operations will increase by approximately 32%, threatening to flush fanihi (Mariana Fruit Bat; Pteropus mariannus) and temporarily or permanently displace species in distress; six special status plants will be threatened and marine animals will experience increased stress from stormwater drainage; the increased potential of invasive species introduction; the generation of hazardous materials and wastes; and significant cumulative adverse impacts onto our Northern Guam Lens Aquifer (NGLA).</p> <p>A number of these adverse impacts were determined as “short-term” and “less than significant” without transparency and clarity as to how these determinations were made. Additionally, such findings are contrary to scientific studies, Chamoru traditional knowledge, and community observations and concerns regarding the declining health of Guam’s environment, including the Proposed Action’s ROI, resulting from military construction and operations.</p>	<p>An assessment of impacts is made in the EIS using best available existing data, surveys that were specifically performed to support the EIS, and in consultation with various resource agencies such as U.S. Fish and Wildlife Service, NOAA Fisheries, the Guam State Historic Preservation Officer, and the Guam Coastal Management Program office. Short term impacts are described for those impacts that are temporary and normally associated with the construction period (for example, construction noise) and long term impacts are normally associated with permanent construction impacts (for example, loss of vegetation/habitat) and ongoing operations. DAF engaged in formal consultation under Section 7 of the ESA to determine what mitigations the USFWS requires for impacts to protected species such as the Mariana fruit bat, as described in Section 3.4. The mitigations, or conservation measures, are detailed in the Biological Opinion, which is included in Appendix B. Stormwater impacts and controls are described in Section 3.8, and each respective section discusses cumulative impacts of other projects in the area.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Julia Faye Munoz	N/A	021b	Water Resources	Of particular concern is the Draft EIS's analysis of adverse impacts onto the NGLA due to stormwater runoff and accidental leaks of fuel, lubricants, and coolant.	The EIS acknowledges potential impacts and notes that construction of stormwater management infrastructure to minimize impacts are described in Section 2.1.2.1.7.
Duplicate	Julia Faye Munoz	N/A	021c	Water Resources	While the Draft EIS determines adverse impacts onto drinking water to be "significant," it states that such cumulative impacts are "mitigable, short-term, and localized" without providing further explanation regarding this determination. This raises concern given historically, military operations and construction have contaminated our island's environment—including our NGLA (e.g. PFAS contamination)—and our island cannot afford to lose this precious water source that provides over 80% of our island's drinking water. Such issues are not unique to Guam, and other communities nationally and internationally have also experienced environmental contamination, including drinking water contamination, because of military operations and construction. Given these circumstances, Comprehensive research and analysis must be done, and made transparent and clear for the island community.	While Section 3.8.3 notes cumulative impacts would be slightly increased, it also notes that ongoing and reasonably foreseeable construction projects are required to comply with federal guidance and regulations to minimize impacts.
Duplicate	Julia Faye Munoz	N/A	021d	Biological Resources	At times, the Draft EIS is unclear regarding its own findings. Regarding marine species, the Draft notes that marine resources surveys were not conducted in the absence of a marine construction proposal, but acknowledges that marine wildlife may experience distress in the Proposed Action's construction and operation.	Essential fish habitat is discussed in Section 3.4.1.4.4 and analyzed in Section 3.4.2.1. Construction of stormwater management infrastructure to minimize impacts to marine resources is described in Section 2.1.2.1.7.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Julia Faye Munoz	N/A	021e	Biological Resources	Equally concerning is the Draft EIS's lack of analysis regarding proposed or increased air operations apart from those addressed in the MITT RODs, yet its acknowledgment of adverse impacts onto fanihi and other species directly affected by these type of operations.	The draft EIS analyzes noise impacts from the operations of up to 12 F-15; however, the actual air operations are analyzed under MITT which has the capacity to include the additional air operations these aircraft represent.
Duplicate	Julia Faye Munoz	N/A	021f	Biological Resources	Also of concern is the lack of analysis regarding the intersection between military operations and construction impacts, and the impacts of Super Typhoon Mawar. A single paragraph mentions Typhoon Mawar's impacts and that a "post-typhoon survey" was conducted between December 2023 to March 2024. The Draft EIS fails to elaborate on the methodology, findings, and analysis regarding the "post-typhoon survey," and how this survey was applied to the Draft EIS's analysis of cumulative impacts.	The 2021 and 2024 Biological Survey Reports that support the EIS and the analysis are available upon request by emailing afcec.aafb.infrasandf-15eis@us.af.mil . Clarification that the analysis includes consideration of the 2024 biological survey have been added to Section 3.4.2.

Duplicate	Julia Faye Munoz	N/A	021g	Biological Resources	<p>As the strongest typhoon Guam has experienced in a little over 20 years that has devastated the island’s environment and people, the extremely brief mention of Typhoon Mawar—and the apparent lack of analysis of how this in turn compounds the Proposed Action’s impacts—is extremely concerning. For example, the Draft EIS notes 439 observations of the native plant fadang (<i>Cycas micronesica</i>). According to an August 2023 scientific study¹, Super Typhoon Mawar is the first major environmental disturbance to impact fadang since the invasive cycad <i>aulacaspis scale</i> (<i>Aulacaspis yasumatsui</i>) introduced in 2003. This same study notes that as a result of Typhoon Mawar, 20% of the fadang population experienced partial defoliation; 52% experienced complete defoliation; 19% experienced windsnap elevated; 8% experienced windsnap at ground; and 1% experienced windthrow. The habitats most adversely affected were in the Northern parts of Guam, with 72% of fadang being defoliated and a majority of this group being 100% defoliated. The Draft EIS’s impacts onto fadang—the most commonly observed special status plant—are concerning given that the plant is extremely susceptible to mortality in its recovery. Because the plant has spent most of its energy reserves combatting the cycad <i>aulacaspis scale</i>, refooliating fadang are less likely to survive. Additional windsnap caused by stem borers (<i>Acalolepta marianarum</i>), and the destruction of windsnap stems by feral swine, further compromise the fadang population’s ability to thrive. The August 2023 scientific study recommends the precautionary principle, and explicitly states that efforts opposing this recommendation go against the best available scientific advice. The study</p>	<p>Information and analysis on biological resources in included in Sections 3.4.1 and 3.4.2 of the EIS. Conservation measures to offset impacts from the Proposed Action were being developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures include development of a habitat enhancement area. Conservation measures are detailed in the Biological Opinion, which is included in Appendix B.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>additionally finds that current conservation efforts are insufficient, and more stringent efforts aligned with scientific recommendations are necessary in order to improve beyond existing efforts that are minimally conservative.</p> <p>Studies find that the loss of fadang greatly increases the potential for permanent loss of biodiversity such as fadang's insect pollinators. Furthermore, the fanihi solely rely on fadang in times where other food sources are unavailable due to environmental disturbances (e.g. typhoons).² It is still unknown how the fanihi would be impacted from the loss of fadang, and it is a risk that our seriously declining species cannot afford to take. The single remaining colony of fanihi and its foraging happen in limestone forests in US military lands, such as those in the ROI. Given these precarious circumstances and our island's ongoing, vulnerable recovery post-Typhoon Mawar, more research and analysis following scientific recommendations are imperative to comprehensively assessing the Proposed Action's adverse impacts onto fadang, fanihi, and the environment as a whole.</p> <p>[Footnotes]</p> <p>1 Lindström et al., "Typhoon Mawar Enables an Assessment of <i>Cycas micronesica</i> Conservation Plans," <i>Journal of Geography & Natural Disasters</i> Vol. 13, Iss. 3, No. 1 (August 2023).</p> <p>2 Jody Haynes, "Exotic Invasive Pest Insect Critically Threatening Guam's Vulnerable Flora, Fauna & Island Ecosystem."</p>	

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Julia Faye Munoz	N/A	021h	Socioeconomics	Regarding housing, an additional 240 personnel and their dependents would be incoming. Beginning in 2030, an estimated 200 support personnel would be on Guam during training events for 2 months per year. All of these populations are expected to be housed off-base, which only worsens our island's struggle to provide housing to our local community and meet the demand of the incoming military population. The ongoing military buildup has greatly contributed to not only increased demand and limited supply that is difficult for our island to keep up with. Additionally, the Overseas Housing Allowance (OHA) has come to be the main influencer on rent and mortgage prices in our housing market.	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Julia Faye Munoz	N/A	021i	Socioeconomics/ Environmental Justice	<p>As a result, our local population is outpriced.3 Members of our local population who are outpriced include those receiving social services, as social service providers struggle to find affordable housing units. With the military population projected to increase by 2,500 people by 2026 and another 15,500 people by 2037,4 the island’s housing crisis will only worsen. On-base housing must be utilized for all incoming military to ensure that there is housing for all. Reports of approximately half of on-base housing being vacant in these past years and the recent development of Marine Corps Base Camp Blaz demonstrate DoD’s ability to provide housing to all of the military population.</p> <p>[Footnotes] 3 Guam Housing and Urban Renewal Authority (GHURA), “Guam Housing Study and Needs Assessment” (January 2020). 4 Joe Taitano II, “Military: Population to grow by 2,500 over next 2 years, roughly 18K by 2037,” Pacific Daily News, March 12, 2024.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability. Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Julia Faye Munoz	N/A	021j	Cultural Resources	Regarding cultural resources, it is unclear why the Draft EIS omitted two project consultations under Section 106 of the National Historic Preservation Act (NHPA). While the Draft EIS notes these projects to be separate pursuits, I am concerned that the consultations which concern the Proposed Action were not included in the Draft EIS. The Draft EIS also notes that at least 3 cultural sites are eligible for the National Register of Historic Places (NRHP). Many of Guam's historical and cultural sites have been destroyed or otherwise compromised as a result of military activities. Artifacts and bones can be lost or broken in the construction process. Additionally, these artifacts and burial grounds become completely inaccessible to the public and the local community, and can even remain in federal custody rather than returned to our Chamoru People.	The Draft EIS presents a summary of the potential adverse effects on historic properties. Archeological surveys were conducted of the area of potential effect, and the findings are summarized but the survey reports are omitted due to the sensitive nature of the information they may contain. Adverse effects on cultural resources/historic properties in the area of potential effect will be managed in accordance with the <i>Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation officer regarding Navy Undertakings on the Island of Guam</i> , November 20, 2008 (see Appendix C). This Programmatic Agreement "applies to all undertakings initiated within the Navy's area of responsibility, regardless of whether they are initiated, funded, and/or carried out by CNRM (Commander, Navy Region Marianas, now Joint Region Marianas) or by another command or lessee of the Navy. Andersen AFB is currently under Navy joint command. This Programmatic Agreement was developed to outline a streamlined Section 106 compliance process for undertakings described by the Programmatic Agreement.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Julia Faye Munoz	N/A	021k	Cultural Resources	<p>It is also extremely difficult for our community to understand the extent of the destruction when federal information is not disclosed. Our Chamoru People's Indigenous identity and relationship with our family and ancestors is a central part of our holistic welfare for many of us, including myself. The preservation of our cultural resources must take precedence to ensure the welfare of our Chamoru People, and to maximize our entire island's community ability to learn more about our island's cultural heritage.</p> <p>To conclude, the Chamoru People have the right to Free, Prior, and Informed Consent (FPIC) and self-determination over their lands, territories, and resources as protected under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). Without prior and proper consultation and consent from the Chamoru People regarding the Proposed Action, further pursuit of the Proposed Action violates the Chamoru People's rights to self-determination and FPIC. The negligence of the Draft EIS per its insufficient findings and inadequate public commentary period evidence violations of the Chamoru People's rights to self-determination and FPIC. This negligence and inadequacy also evidences a lack of genuine care and collaborative effort towards the welfare of our entire island community.</p>	<p>Your comment has been noted on the important issues of self-determination, Chamoru rights, and indigenous rights on Guam.</p> <p>The Draft EIS presents a summary of the potential adverse effects on historic properties. Archeological surveys were conducted of the area of potential effect, and the findings are summarized but the survey reports are omitted due to the sensitive nature of the information they may contain. Adverse effects on cultural resources/historic properties in the area of potential effect will be managed in accordance with the <i>Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation officer regarding Navy Undertakings on the Island of Guam, November 20, 2008</i> (see Appendix C). This Programmatic Agreement "applies to all undertakings initiated within the Navy's area of responsibility, regardless of whether they are initiated, funded, and/or carried out by CNRM (Commander, Navy Region Marianas, now Joint Region Marianas) or by another command or lessee of the Navy. Andersen AFB is currently under Navy joint command. This Programmatic Agreement was developed to outline a streamlined Section 106 compliance process for undertakings described by the Programmatic Agreement.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Julia Faye Munoz	N/A	0211	Unsubstantive	With this said, I find the Draft EIS inadequate in its methodology, findings, analysis, and the processes through which DoD has engaged the CHamoru People and my island community towards genuine collaboration. I am concerned of the true magnitude of the impacts identified and find that the Draft EIS does not provide an accurate, comprehensive analysis of the Proposed Action's impacts. Comprehensive elaboration and research, along with the full recognition of the CHamoru People's Right to Free, Prior, and Informed Consent (FPIC) and self-determination over their lands, territories, and resources, are rights inherent to the People of Guam. The Proposed Action and Draft EIS fail to genuinely recognize these rights, and fails to even provide a comprehensive study that all of our island community deserves. For these reasons, I am opposed to the Proposed Action and urge for the No Action Alternative.	Thank you for your correspondence. Your comment has been noted. The Air Force understands its responsibilities and has the utmost respect for the CHamoru People.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Federal Agency	Jean Prijatel	USEPA	022a	Noise	<p>Noise Impacts</p> <p>Following the EPA's review of the Draft Environmental Impact Statement for the F-15 Beddown and Infrastructure Upgrades at Anderson Air Force Base, it appears that the noise impact assessment methodology is limited and not sufficient to assess all noise effects. The assessment methodology identifies two criteria that would result in a significant impact conclusion: (1) the violation of any federal, state, or local noise ordinance, or (2) a substantial increase in areas of incompatible land use outside the installation (p. 3-121). For the first criterion, the DEIS states that no federal, state, nor local noise regulations are directly applicable to the Proposed Action (p. 3-114); therefore, by design, no impacts would be considered significant based on this criterion. For the second criterion, no definition of substantial increase is provided.</p>	<p>There are no well-established or regulatory metrics or thresholds for determining significance with respect to aircraft noise exposure under NEPA. The determination that the proposed action would not introduce appreciable changes in land use and would have less-than-significant effects was made based on comparison to changes in noise from similar actions at other installations. For the majority of individuals, this change in the noise environment would be barely perceptible when compared to existing conditions, and limited to individuals living adjacent to the installations and directly under the approach and departure flight paths for a long established and active Air Force Base. Therefore, the determination of level of effects was not changed for the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022b	Noise	<p>Additionally, the DEIS contains contradictory information using the Day-Night Average Sound Level (DNL) metric; it is not clear how many homes and individuals would be newly impacted under the noise contours. Page 3-124 states that under the Proposed Action, 569 acres off-base would be within the 65-decibel (dBA) DNL contour and this would be an increase in approximately 40 homes (i.e., approximately 138 individuals) within the 65-dBA DNL contour, the level normally not recommended for residential land uses. However, Page 3-81 states that the amount of off-base land affected by the expanded noise contour would be approximately 811 acres, which would be an increase of 374 acres and this would include approximately 60 additional homes within the 65 dBA DNL contour, without an estimate of number of individuals. Table 3-29 includes acreages but not associated homes/populations. There was no noise study in the appendices to consult for clarity, which is a very unusual omission.</p>	<p>Text in EIS Environmental Justice section was updated to be consistent with the acreage, number of homes, and number of individuals specified in the Draft EIS Section 3.11, Noise analysis. However, due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022c	Socioeconomics	The EPA also identified concerns that the housing demand from the project is expected to be borne by the Guam housing market, already overburdened from a high level of military construction, and we recommend a discussion of increased housing costs on the local community with environmental justice concerns.	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p> <p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of local housing affordability.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022d	Cultural Resources	The EPA also identified concerns regarding impacts to cultural resources and we note that the project site contains rich archeological resources, impacts to which add to the significant cumulative impact scenario, which was not captured due to the narrow scope of this assessment. We suggest expanding the assessment, including considering the social and cultural effects on the community with environmental justice concerns, and recommend meaningful engagement with this community before finalizing the EIS.	The Draft EIS presents a summary of the potential adverse effects on historic properties. Archeological surveys were conducted of the area of potential effect, and the findings are summarized but the survey reports are omitted due to the sensitive nature of the information they may contain. Adverse effects on cultural resources/historic properties in the area of potential effect will be managed in accordance with the <i>Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation officer regarding Navy Undertakings on the Island of Guam</i> , November 20, 2008 (see Appendix C). This Programmatic Agreement "applies to all undertakings initiated within the Navy's area of responsibility, regardless of whether they are initiated, funded, and/or carried out by CNRM (Commander, Navy Region Marianas, now Joint Region Marianas) or by another command or lessee of the Navy. Andersen AFB is currently under Navy joint command. This Programmatic Agreement was developed to outline a streamlined Section 106 compliance process for undertakings described by the Programmatic Agreement.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022e	Noise	<p>Annoyance</p> <p>The DEIS does not discuss noise modeling results in terms of community annoyance. The DEIS simply indicates that annoyance is naturally included in the effects of the overall noise environment (i.e., DNL)(p. 3-126). The Department of Defense (DoD) Technical Bulletin Community Annoyance Caused by Noise from Military Aircraft Operations (December 2009)¹ states that the concept of “community annoyance” was developed to provide one comprehensive term to describe the overall community response to noise, including both degradation of outdoor activities and interference with indoor activities. The cover of the DoD Technical Bulletin states:</p> <p>“Long term community annoyance from aircraft noise is typically the greatest adverse effect of low altitude, subsonic overflights of residential populations. Understanding annoyance is essential to successful public relations in the vicinity of air installations and operating areas, and to informed decisions on changes to the military operations.”</p> <p>[Footnotes]</p> <p>1 https://www.denix.osd.mil/dodnoise/denix-files/sites/99/2024/01/community_annoyance.pdf</p>	<p>The discussion in the DEIS included supplemental noise metrics (i.e., Lmax and SEL) to provide a better description of the actual effects. "Annoyance" is in many ways a qualitative metric, and more of a reflection of these other metrics and effects. The Technical Bulletin cited cautions the approach suggested by the commenter, and for various reasons specifically states that "it is unadvisable to predict that a specific percentage of the population affected by your operations will be highly annoyed at a given DNL."</p> <p>Section 3.3.1 addresses current and ongoing activities the DAF engages in with the community. Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022f	Noise	<p>The EPA supports DoD's statement that understanding annoyance is essential for informed decisions and successful public relations and disclosure. Community annoyance is especially important because it helps translate noise values that are expressed in DNL, which is an averaging metric that does not represent the noise level people actually experience. Indeed, the Government Accountability Office found that providing information on potential noise impacts grounded in DNL was not clear enough for communities to understand planned changes.²</p> <p>[Footnotes] ² https://www.gao.gov/assets/gao-22-105844.pdf</p>	<p>The discussion in the DEIS included supplemental noise metrics (i.e., Lmax and SEL) to provide a better description of the actual effects. "Annoyance" is in many ways a qualitative metric, and more of a reflection of these other metrics and effects. The Technical Bulletin cited cautions the approach suggested by the commenter, and for various reasons specifically states that "it is inadvisable to predict that a specific percentage of the population affected by your operations will be highly annoyed at a given DNL."</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022g	Noise	<p>As the DoD Technical Bulletin indicates, assessing community annoyance from noise uses various concepts, including the “Schultz Curve,” developed from extensive studies where DNL is shown on the X axis and the percent highly annoyed on the Y axis, and is generally part of Air Force noise disclosures.³ This curve has been updated over the years; the most recent update by the FAA using their recent Neighborhood Environmental Survey found a substantial increase in the percentage of people who are highly annoyed by aircraft noise over the entire range of aircraft noise levels considered, including at lower noise levels.⁴</p> <p>[Footnotes]</p> <p>³ https://www.113wg.ang.af.mil/Portals/12/Aircraft%20Noise%20An%20enviro%20Perspective.pdf</p> <p>⁴ https://www.faa.gov/regulations_policies/policy_guidance/noise/survey</p>	<p>The DAF and other federal agencies, including the FAA, use the FICON dose-response curve (i.e., the modified Shultz Curve) and the 65 dBA DNL metric to assess the effects of noise for land use planning purposes; therefore, annoyance levels obtained from FAA’s Neighborhood Environmental Survey were not included in the EIS. Notably, the Shultz Curve is based on metadata from many studies combined; whereas the FAA study is a standalone study that is in contradiction to decades of study and precedent. It requires additional verification and proof of repeatability before its widespread use is adopted.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022h	Noise	<p>Sleep disturbance</p> <p>Noise-induced sleep disturbance is considered the most deleterious non-auditory effect of environmental noise exposure.⁵ While under the proposed action, total aircraft operations at Andersen AFB are anticipated to increase by 32 percent (p. 2-15), 22 percent of operations⁶ would occur between 10:00 p.m. and 7:00 a.m. (p. 3-125). The DEIS concludes that individuals on and near the installation would experience a 22 percent increase in the number of acoustical events at night loud enough to interfere with sleep (p. 3-126). Table 3-30 identifies the noise Sound Exposure Levels (SELs) from six different aircraft during takeoff and landings, and F-15s are above the SEL threshold (not to exceed 90 dBA SEL) even at 5,000 feet. The DEIS provides very little information regarding awakenings and does not include predictions for windows open and windows closed as is conveyed conceptually in Table 3-27 - Probability of Awakening.</p> <p>[Footnotes]</p> <p>5 Aviation Noise Impacts: State of the Science. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5437751/?report=printable</p> <p>6 an annual increase of approximately 239 takeoffs and 219 landings (p. 3-125)</p>	<p>Comment is consistent with Sections 3.10.1.4 and 3.10.2.1. As shown in Table 3-25, for limited number of events above 90 dBA SEL, the difference in probability of awakening between windows open and closed is marginal. The range of probability of awakening provided in the EIS (i.e., 2 to 3 percent) accounts for both windows open and windows closed conditions.</p>

Duplicate	Jean Prijatel	USEPA	022i	Environmental Justice/ Noise	<p>Environmental Justice</p> <p>The DEIS acknowledges that impacts would be disproportionate on a community with environmental justice concerns (p. 3-81). The DEIS states that disproportionate impacts on these vulnerable and overburdened communities were considered significant under NEPA if they would, among other things, “reduce environmental quality to affect reduced health” (p. 3-79). We interpret this to mean potentially affect human health. However, impacts to sleep, which are known to affect health, were not considered.⁷ No mitigation measures are identified for noise (p. 3-127). Neither the DEIS nor the public scoping summary in the appendix identify meaningful engagement with this population.</p> <p>[Footnotes]</p> <p>⁷ “The epidemiologic evidence that chronically disturbed or curtailed sleep is associated with negative health outcomes (such as obesity, diabetes, and high blood pressure) is overwhelming” - Aviation Noise Impacts: State of the Science referenced above.</p>	<p>As outlined in Section 3.10.2 of the Draft EIS, the Proposed Action would have an increase in the number of nighttime overflights and associated acoustical events, with a subsequent marginal increase in the probability to interfere with sleep for individuals adjacent to the base; particularly those living under the flight line to the south. These disturbances can affect sleep quality in a small percentage of individuals by delaying sleep onset, causing early awakenings, and reducing deep and REM sleep, all of which are important for recuperation and memory consolidation. Short-term effects of noise-induced sleep disturbances include impaired mood, increased daytime sleepiness, and reduced cognitive performance. Although not well studied, sleep awakenings from noise also have the potential for additional long-term health implications. Notably, most sleep disturbances near airports are not directly linked to aircraft noise, and the impact is generally less severe than clinical sleep disorders like obstructive sleep apnea. The DAF's primary noise reduction strategy is implementing flight protocols and practices, and the tracking of noise complaints and resolution. The primary protocol to reduce noise at the base is to execute the majority of take-off and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and would be the standard practice for the proposed F-15s. Architectural upgrades and other</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
						<p>noise reduction elements have not been carried forward as an additional mitigation measure in the Final EIS or ROD. Text was added to Noise Section 3.10.14 to reflect the standard protocol for flight operations to avoid or minimize the potential for aircraft noise effects on populated areas.</p> <p>Section 3.3.1 addresses current and ongoing activities the DAF engages in with the community.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022j	Noise	<p>Recommendations: The EPA recommends improvements to the noise impact assessment in the FEIS. Include populations in Table 3-29 since additional acreage exposed is not a meaningful disclosure for noise without information on the number of receptors. Interpret the DNL values in terms of community annoyance. We recommend utilizing the most updated dose-response curve prepared by the Federal Aviation Administration. Provide additional information regarding sleep disturbance; consider using potential for awakenings (PA) which conveys the percentage of the population in the affected census blocks that would be awakened at least once per night under the existing noise conditions and the additional awakenings predicted under the proposed action (there were no alternatives).</p>	<p>Census block data is not precise enough to make population estimations of effects based on noise data. The EIS includes ariel counts of individuals that would be exposed to 65 dBA DNL both with and without the proposed action., 12% of which would be highly annoyed. These individuals are currently exposed to greater than 60 dBA DNL, and approximately 6% are already highly annoyed. The exposure to 65 dBA DNL is the level EPA does not normally recommend for noise sensitive land uses, and it has become the standard for land use planning for all federal agencies. It is a reflection of both sleep awakenings and communication interference. The information in the EIS was provided in such a way as it could be translated to an individual's experience. If an individual was currently being awakened once or twice a month, they can expect to be awakened 2 to 3 times a month with the proposed action.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022k	Environmental Justice/ Noise	Discuss how noise effects would disproportionately impact a population with environmental justice concerns and how that could affect the options individuals could take should increased noise, especially at night, prove unbearable (e.g. relocation options considering the impacts on housing from multiple military construction projects – see comment below). Append the Noise Study to the FEIS.	There are no "noise studies" other than the noise modeling that was conducted with the rest of the conclusions about noise effects on people extrapolated using existing guidance. See also the response to Comment 022i regarding measures to avoid or minimize aircraft noise impacts on the surrounding populations, which include communities of environmental justice concerns. Text was added to Noise Section 3.10.4 to reflect the standard protocol for flight operations to avoid or minimize the potential for aircraft noise effects on populated areas. Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	0221	Noise/ Mitigation	<p>Discuss potential mitigation for noise impacts as required by NEPA.⁸ The EPA recommends providing information on DoD's Community Noise Mitigation program,⁹ which is now accepting applications through October 22, 2024. We recommend providing assistance to navigate this program's requirements and providing outreach prior to the deadline. Consider distributing information on actions that homeowners themselves can pursue to reduce noise.¹⁰ Document the process for meaningful community engagement in the FEIS, including feedback received and how it was incorporated.</p> <p>[Footnotes]</p> <p>⁸ CEQ's Forty Most Asked Questions, 19(b). "All relevant, reasonable mitigation measures that could improve the project are to be identified"</p> <p>⁹ https://oldcc.gov/our-programs/community-noise-mitigation-program</p> <p>¹⁰ For example, this Navy brochure: https://www.wbdg.org/files/pdfs/Sound_Isolation_Brochure_2018.pdf</p>	<p>The primary protocol to reduce noise at the base is, and will continue to be, to execute the majority of take-off and landings over the water to the north of the base. This was included in the noise modeling effort for the EIS and will be the standard practice for the proposed F-15s. Unfortunately, the DoD's Community Noise Mitigation program application deadline passed at the time the Final EIS was published.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022m	Socioeconomics/ Proposed Action	<p>Population increases and housing</p> <p>The DEIS indicates that approximately 500 construction workers are required for the North Ramp construction (p. 2-9), that 240 personnel and dependents would relocate to Guam to support the Proposed Action (p. 3-62), and an additional 200 temporary periodic support personnel (without dependents) would relocate for planned training exercises. The DEIS states that it is assumed that all these personnel would reside in off-installation housing in Guam (p. 2-3, 3-62). The greatest potential increase in installation personnel would occur after the F-15 beddown was complete, during a training event, and prior to completion of construction of the infrastructure upgrades, during which the total personnel and dependent population would increase by approximately 11 percent (p. 2-15). It appears the project does not include any new housing at Andersen AFB for these personnel, and the increase in personnel is expected to be borne by the Guam housing market. The DEIS concludes that, because there were 3,544 vacant housing units within the region of influence in 2020, there would be a less than significant adverse impacts on housing in Guam (p. 3-62). We did not find the housing demand and supply analysis (p. 3-60) that the Air Force indicated, in its response to scoping comments in Appendix A, would be in the Socioeconomics analysis, and we note that housing was not mentioned at all in the Socioeconomic appendix.</p>	<p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of local housing affordability from the Joint Region Marianas 2024 Housing Requirements Market Analysis.</p>

Duplicate	Jean Prijatel	USEPA	022n	Socioeconomics	<p>The DEIS indicates that construction activity in Guam is high, with previously permitted and contracted projects currently underway and expected to increase in 2024 from additional construction contracts with a steady increase in the required construction labor and workforce (p. 3-54). The analysis assumed a total of approximately 30 percent of positions were anticipated to be held by Guam residents, but with the current level of construction now occurring, this assumption does not seem to be supported. It appears that the situation on the ground is very fluid and an accurate assessment of impacts to local residents should reflect the most recent data available. Besides housing availability, the DEIS does not address how housing costs are affected from all the military construction, which impacts local residents. According to recent press reports, the median price for housing is now 54 percent higher than the median price in 2018. A slight 7 percent dip in 2023 invited conclusions that many people can no longer afford a single-family dwelling.¹¹ Indeed a lack of housing has been identified as the limiting factor for bringing in more foreign construction workers.¹²</p> <p>[Footnotes]</p> <p>11 https://www.guampdn.com/news/median-home-prices-dip-slightly-to-415k-as-buyers-priced-out-of-market/article_10361946-7301-11ee-a7da-e32728c45c29.html</p> <p>12 https://www.guampdn.com/news/record-high-5-508-skilled-foreign-workers-on-guam-for-military-buildup/article_d0c7c482-248d-11ef-b979-b3d605be7df0.html</p>	<p>The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of local housing affordability and the impacts on housing costs from current and ongoing military construction. Additional information was added regarding construction worker housing.</p>
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Duplicate	Jean Prijatel	USEPA	022o	Socioeconomics	<p>Recommendation: The EPA recommends a more detailed analysis of impacts to housing. Include the referenced housing demand and supply analysis in the Socioeconomic Appendix. Provide supporting information justifying the conclusion that 30 percent of the workforce would be local. Discuss how the costs of housing are affecting the local population. We note that Section 1077 of the 2024 National Defense Authorization Act requires an assessment of the adequacy of civilian infrastructure in Guam for supporting the requirements of United States Indo-Pacific Command. Append or summarize this assessment if available before the FEIS is published.</p>	<p>The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information, including a discussion of military housing allowance and its impact on local housing affordability from, and updated requirements data from the Joint Region Marianas 2024 Housing Requirements Market Analysis. The 2024 market analysis projects military housing needs and shortfalls through planning year 2029. The RSAF personnel would not arrive on Guam until 2029, allowing time for DoD to identify housing solutions.</p>

Duplicate	Jean Prijatel	USEPA	022p	Cultural Resources	<p>Impacts to Cultural Resources</p> <p>The DEIS documents the human remains (tooth and bone fragment) discovered at the MSA-1 Project area during a June 2021 cultural resources investigation (p. 3-43). Additionally, three National Register of Historic Places (NRHP)-eligible archaeological sites were identified within the North Ramp Area, the physical integrity of which could be affected by the construction of the proposed infrastructure (p. 3-46). These artifacts have the potential to provide additional information important to the archaeology of the northern plateau (p. 3-43). For one site, the large number of artifacts discovered offer the potential for reconstructable vessels that could provide diagnostic data on the site's use. There are also impacts to historic sites in the NRHP-eligible North Field historic district.</p> <p>The DEIS indicates that to achieve National Historic Preservation Act Section 106 compliance, it intends to use the existing 2008 JRM Programmatic Agreement (p. 3-44). The list of consultation actions taken to date is included in Appendix C, which documents correspondence with the Guam State Historic Preservation Officer (SHPO). The content of the responses from the SHPO are not included, save for the determination by the Keeper of the NRHP on eligibility of 11 of 13 sites for inclusion on the National Register. Because of the rich cultural resources on the project site, and the potential for impacts, the EPA recommends that the Air Force revise the DEIS impact characterization currently identified as "less than significant" (p. 3-45) to more accurately reflect the potential for significant impacts.</p>	<p>The EIS acknowledges adverse effects to historic properties and is following the provisions of the cited 2008 JRM Programmatic Agreement for compliance with Section 106 of the NHPA and resolution of adverse effects.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022q	Cultural Resources	<p>Additionally, the scope of the cumulative impact assessment for cultural resources is entirely too narrow, referencing only Andersen AFB. While Table 3-1. Reasonably Foreseeable Projects lists the Guam and CNMI Military Relocation, it limits the scope to just those actions on Andersen AFB. We cannot comment on NHPA compliance but note that the impacts to the CHamoru from the construction of Camp Blaz and associated very large impact to cultural resources has been distressing.¹³ Construction clearing for the Marine Corps Base Camp Blaz revealed more than 1,800 artifacts and 26 areas with human remains ranging from bone fragments to burial sites. The unearthing of four burials at Magua, estimated to be 1,000 years old, yielded information that could rewrite history books since the discoveries were changing the understanding of human habitation on the northern plateau. Since the project site investigations already unearthed resources that are also important to the archaeology of the northern plateau, this should help define the scope of the cumulative impact assessment.</p> <p>[Footnotes] 13 https://www.guampdn.com/news/most-artifact-recovery-at-camp-blaz-is-complete/article_99a73cb4-2fe1-11ed-85dc-f386601d6295.html and https://www.guampdn.com/news/human-bone-fragments-found-at-camp-blaz-laid-to-rest/article_770bd6f6-f317-11ee-88ef-4bc25f05a526.html</p>	<p>The Draft EIS presents a summary of the potential adverse effects on historic properties. Archeological surveys were conducted of the area of potential effect, and the findings are summarized but the survey reports are omitted due to the sensitive nature of the information they may contain. Adverse effects on cultural resources/historic properties in the area of potential effect will be managed in accordance with the <i>Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation officer regarding Navy Undertakings on the Island of Guam, November 20, 2008</i> (see Appendix C). This Programmatic Agreement "applies to all undertakings initiated within the Navy's area of responsibility, regardless of whether they are initiated, funded, and/or carried out by CNRM (Commander, Navy Region Marianas, now Joint Region Marianas) or by another command or lessee of the Navy. Andersen AFB is currently under Navy joint command. This Programmatic Agreement was developed to outline a streamlined Section 106 compliance process for undertakings described by the Programmatic Agreement.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022r	Environmental Justice/ Cultural Resources	<p>Additionally, while NHPA may focus more on impacts to historic properties, NEPA includes the consideration of interrelated social and cultural effects on a community, and in this case, on a community with environmental justice concerns.¹⁴ As previously mentioned in the Noise comment above, it is unclear what meaningful engagement with this community has occurred, and this is a concern also for cultural resources. Whether discussed in the EJ or Cultural Resources section, these cumulative impacts and their effects on the community, should be reflected in the NEPA analysis and documentation.</p> <p>[Footnotes]</p> <p>¹⁴ “Environmental justice issues encompass a broad range of impacts covered by NEPA, including impacts on the natural or physical environment and interrelated social, cultural, and economic effects.” Council on Environmental Quality (2013) NEPA and NHPA: A Handbook for Integrating NEPA and Section 106</p>	<p>The cumulative impacts discussions for Cultural Resources were expounded to include consideration of noise effects. In addition, DAF coordinated closely with the most affected (i.e. nearby) village mayors as the leaders of the communities, by appearing in person with project information, requesting the most ideal locations and formats for public outreach for their communities, and holding public meetings in those communities.</p> <p>Section 3.3.1 addresses current and ongoing activities the DAF engages in with the community.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022s	Cultural Resources	Recommendation: We recommend improvements to the assessment of impacts to cultural resources. In the FEIS identify how feedback from the SHPO has influenced decision-making and expand the scope of the cumulative impact assessment to include the whole of the northern plateau. Engage meaningfully with the community and describe the actions to improve engagement in the FEIS. Discuss the social and cultural effects on the community.	The Draft EIS presents a summary of the potential adverse effects on historic properties. Archeological surveys were conducted of the area of potential effect, and the findings are summarized but the survey reports are omitted due to the sensitive nature of the information they may contain. Adverse effects on cultural resources/historic properties in the area of potential effect will be managed in accordance with the <i>Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation officer regarding Navy Undertakings on the Island of Guam, November 20, 2008</i> (see Appendix C). This Programmatic Agreement "applies to all undertakings initiated within the Navy's area of responsibility, regardless of whether they are initiated, funded, and/or carried out by CNRM (Commander, Navy Region Marianas, now Joint Region Marianas) or by another command or lessee of the Navy. Andersen AFB is currently under Navy joint command. This Programmatic Agreement was developed to outline a streamlined Section 106 compliance process for undertakings described by the Programmatic Agreement.

Duplicate	Jean Prijatelj	USEPA	022t	HazMat	<p>Hazardous Contamination</p> <p>Andersen AFB is a Federal Facility National Priorities List (NPL) site pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as Superfund. The proposed North Ramp Site Layout overlaps with the footprint of Installation Restoration Program (IRP) Site 78 and B2550 and is adjacent to the footprint of both IRP Site 26 and IRP Site 68. Both Site 78 and Site 26 have been identified as potential Per- and polyfluoroalkyl substances (PFAS) areas of interest in the AAFB installation-wide PFAS Preliminary Assessment. Review of preliminary validated data from the AAFB installation-wide PFAS Site Investigation (SI) efforts indicate PFAS exceedances of project screening levels in the areas of Site 78, Site 26 as well as B2550. The preliminary data also indicates that the lateral and vertical extent of PFAS contamination have not been fully delineated; therefore, the footprint of Site 78 and Site 26 could expand.</p> <p>Recommendation: The EPA strongly recommends that the Air Force coordinate with Joint Region Marianas, as the lead response authority under the Defense Environmental Restoration Program, as well as both the EPA and Guam EPA, as the regulatory oversight authorities to determine how PFAS contamination will be addressed. The EPA recommends that the following be included in the FEIS:</p> <ol style="list-style-type: none"> 1. validated PFAS analytical results for samples collected under the AAFB PFAS SI; 2. a discussion on PFAS extent of contamination within the footprints of the IRP sites and within the proposed North Ramp Site; and 	<p>Section 3.16.1.4 revised to include the latest information regarding PFAS investigations on Andersen AFB, including for Sites 78 and 26. Text revised to note PFAS was detected in some soil samples at these sites, and Andersen AFB is now sharing the validated sampling data with regulators and plans to move both sites on to the Remedial Investigation phase of the CERCLA process. Text revised to note the lateral and vertical extent of PFAS contamination has not yet been fully delineated so the boundaries of Sites 78 and 26 could change from that shown in the EIS.</p> <p>Section 3.16.2.1 revised to state CERCLA actions would be performed independent of this EIS and the proposed North Ramp development actions. CERCLA actions would inform the design of the North Ramp development to the extent of possible PFAS contamination and the need to develop PFAS avoidance and management measures to implement the Proposed Action.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					3. a discussion on how the PFAS contamination will be addressed.	
Duplicate	Jean Prijatel	USEPA	022u	Infrastructure	<p>Waste Management/Green Waste</p> <p>The DEIS indicates that non-hazardous solid waste generated on Andersen AFB is disposed at the Layon Landfill owned by the Guam Solid Waste Authority. We note that the Layon Landfill does not accept corrugated cardboard and cardboard boxes; untreated wood, construction lumber, or pallets; or green waste. According to the DEIS, contractors would clear surface vegetation and “grub” (i.e., remove roots remaining in the soil) in the project area, removing 17 acres of vegetation (p. 34). It also states that at the North Ramp and MSA-1 project areas, 107 acres would be subject to vegetation clearance (p. 38). There is no information on how this green waste will be managed.</p> <p>Recommendation: The EPA recommends all vegetation be mulched and left in place or composted. Multiple large scale permitted compost facilities are available in Guam. We recommend a commitment to inspect green waste material for the presence of the invasive Rhinoceros Beetle, Brown Tree Snake, or other invasive species with coordination with the University of Guam College of Natural & Applied Sciences Agriculture Department and/or the United States Fish and Wildlife Service to prevent the spread of invasive species.</p>	DAF would require construction contractors follow recommendations to inspect green waste material for the presence of the invasive Rhinoceros Beetle, Brown Tree Snake, or other invasive species. DAF adheres to applicable biosecurity plans and coordinates to the degree practicable with the University of Guam College of Natural & Applied Sciences Agriculture Department and the United States Fish and Wildlife Service to prevent the spread of invasive species.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022v	Infrastructure	<p>On a minor note, the DEIS references Executive Order 13693 but this EO has been revoked; the FEIS should be updated to reference Executive Order 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, requiring federal agencies to divert 50% of solid waste and construction and demolition debris from landfills and incinerators by 2025 and 75% by 2030.15</p> <p>[Footnotes] 15 See https://www.whitehouse.gov/briefing-room/presidential-actions/2021/12/08/executive-order-on-catalyzing-clean-energy-industries-and-jobs-through-federal-sustainability/ EO 14057 Implementing Instructions: https://www.sustainability.gov/pdfs/EO_14057_Implementing_Instructions.pdf</p>	The EIS text was updated in EIS section 3.9.2.1.2 to reference the correct EO.
Duplicate	Jean Prijatel	USEPA	022w	North Ramp	<p>Impacts from large amount of fill</p> <p>According to the DEIS, due to the topography in the North Ramp area, site preparation will require 35 feet of fill in some locations, requiring over 1 million cubic meters of fill (p. 2-6). The Air Force assumes that the majority of the fill would come from borrow areas within the installation boundaries, transported in approximately 100,000 deliveries by construction vehicles (p. 2-12, 2-16), with some coming from fill suppliers in Guam such as Smith Bridge Quarry in Yigo (p. 2-6).</p> <p>Recommendation: Identify the source area for this very large amount of fill on the installation.</p>	The on installation source is the project site itself where cut is required.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022x	Biological Resources	Identify the source area for this very large amount of fill on the installation. Identify whether vegetation or other biological resources would be impacted.	Sections 2.1.2 and 3.6.2.1.2 state, "It is assumed that fill material would be obtained from higher elevations within the North Ramp project area and from fill suppliers on Guam." There would be no anticipated impacts to vegetation or other biological resources.
Duplicate	Jean Prijatel	USEPA	022y	Air Quality	Identify the source area for this very large amount of fill on the installation. Ensure the truck emissions from the 100,000 deliveries are included in the air quality assessment.	Transportation of materials to and from the site were included in the estimation of air emissions in Table 3-32 of the DEIS.
Duplicate	Jean Prijatel	USEPA	022z	Biological Resources	Biological Resources The analysis in the DEIS does not establish less than significant impacts on the endangered Mariana fruit bat from aircraft noise from the 32 percent in aircraft operations under the proposed action (p. 3-29). The rationale provided is that the noise levels would not increase, only the frequency of exposure to these levels would increase; therefore, long-term, less than significant, adverse impacts on the noise environment would be expected. This conclusion does not follow from the previous statement, especially since the DEIS documents a study where a flushing response occurred most of the time after overflights (p. 3-29).	The 2012 survey observed a total of 8 bats that flushed in response to aircraft overflights. The subsequent paragraph in the EIS describes additional noise and bat studies (USGS, Tarnovsky et al., Almeida et al., DON). The EIS concludes that based on previous surveys and general research on Mariana fruit bats, noise related to existing aircraft operations and munitions at the CATM Range does not deter continued bat presence at the Station 67 roost. Instead, roost selection is focused on food availability, site security, and protection from poaching. These short- and long-term noise impacts on Mariana fruit bats are considered less than significant.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022aa	Biological Resources	We are concerned that DoD has started describing secondary limestone forest as "limestone degraded forest" in NEPA documents; secondary limestone forest has been the descriptor in DoD documents for the last 20 years. Few areas are pristine; yet they continue to have habitat value, as evidenced by the presence of special status species.	The EIS uses terms consistent with the Joint Region Marianas Integrated Natural Resources Management Plan which uses and defines degraded limestone forest as, "forest communities are typically dominated by the non-native invasive tree <i>Vitex parviflora</i> and in some areas, the bay rum tree (<i>Pimenta racemose</i>). This plant community has one or more of the following characteristics: (1) dominated by a variety of non-native woody species, (2) substantial forest clearings, or (3) dominated by pago (<i>Hibiscus tiliaceus</i>), a tree species usually indicative of disturbance in Guam's limestone forests." A definition has been added to Section 3.4.1.4 of the EIS as well as clarification that it provides species habitat.
Duplicate	Jean Prijatel	USEPA	022ab	Biological Resources	Recommendation: The EPA recommends amending the analysis in the FEIS with input from the Section 7 consultation with the USFWS regarding the Mariana fruit bat.	The EIS was updated after issuance of the final Biological Opinion, which is included in Appendix B of the EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Jean Prijatel	USEPA	022ac	Biological Resources	Explain the change in nomenclature when describing secondary limestone forest. We recommend reverting to the historic use of the terms. Many environmental resources are degraded; it does not serve NEPA's purpose to describe them as such in the impact assessment. The existing condition of resources are to be identified in the description of the affected environment.	The EIS uses terms consistent with the Joint Region Marianas Integrated Natural Resources Management Plan which uses and defines degraded limestone forest as, "forest communities are typically dominated by the non-native invasive tree <i>Vitex parviflora</i> and in some areas, the bay rum tree (<i>Pimenta racemose</i>). This plant community has one or more of the following characteristics: (1) dominated by a variety of non-native woody species, (2) substantial forest clearings, or (3) dominated by pago (<i>Hibiscus tiliaceus</i>), a tree species usually indicative of disturbance in Guam's limestone forests." A definition has been added to Section 3.4.1.4 of the EIS as well as clarification that it provides species habitat.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Political	Therese M. Terlaje	Speaker, Guam Legislature	023a	Other	<p>Indigenous Knowledge and Cumulative Impacts</p> <p>In the last 20 years, through Legislative Resolutions, Bills, and Government Correspondence, the Guam Legislature has addressed numerous impacts resulting from actions proposed and conducted by the Department of Defense (DoD). Through public hearings on many of these matters, the Guam Legislature has received testimony in the form of oral tradition and written script. What remains clear is that the people of Guam are the original stewards and caretakers of this natural and cultural environment and maintain a reciprocal relationship with the places and landscapes that surround them. It has been significantly challenging and burdensome for the people of Guam to sustain this interdependent relationship with their lands, landscapes, and, importantly, sacred and cultural-historic sites because DoD projects have been prioritized unequivocally over Indigenous People and their knowledge and relationship to place.</p> <p>Effectively integrating Indigenous worldviews into federal decision-making processes would help the Department of the Air Force (DAF) establish better relations with the people of Guam.</p>	<p>The DAF recognizes the significance of sacred sites and the sociocultural relationship between Indigenous People and the land. Maintaining a meaningful relationship with Indigenous People is considered an important initiative in support of the mission at Andersen AFB. Joint Region Marianas acts as the interface between DoD components and tenants through assigned regional installations on Guam and the Northern Mariana Islands and the civilian community.</p>

Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023b	Cumulative	<p>Per 40 CFR 1508(g)(3), “cumulative impact” is defined as “the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal, nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually less than significant but collectively significant actions taking place over a period of time. Past actions are those actions, and their associated impacts, that have shaped the current environmental conditions of the project area.”</p> <p>The integration of Indigenous worldviews would see the “cumulative impacts” of this project area in the context of other DoD projects past, present, and future and thus this particular DAF project should also incorporate this cumulative approach when considering environmental impacts of DoD projects throughout the island. For example, in addition to the Draft EIS for F-15 Beddown and Infrastructure Upgrades at Andersen AFB, the community of Guam is tasked with reviewing and responding to multiple EISs and EAs, and particularly, the Missile Defense Agency (MDA) Guam Flight Test Proposed Final Environmental Assessment/Overseas Environmental Assessment (EA/OEA) by August 2, 2024. What is the specific relationship between the DAF F-15 Beddown and Infrastructure Upgrade and the MDA Guam Flight Test Final EA/OEA? How does the DAF address the cumulative environmental impacts of these two projects? What efforts have been made to work with the MDA to ascertain that cumulative environmental impacts are acknowledged</p>	<p>The cumulative impact projects table in Section 3.3 was updated to include MDA’s Guam Flight Test proposal. The cumulative impact discussion for Noise (Section 3.10) was updated to account for this reasonably foreseeable project.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					and addressed within Indigenous Knowledge frameworks?	

Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023c	Other	<p>Furthermore, it is stated that the Purpose of the DAF DEIS is to construct infrastructure upgrades, and to beddown and support the mission requirements of up to 12 F-15 fighter aircraft at Andersen Air Force Base (AFB), Guam, and; to increase and improve airfield and munitions infrastructure in order to address capability gaps and allow for greater efficiencies and agility in the way ground operations are conducted; that the use of this infrastructure is consistent with the types of operations currently occurring on the installation. Expressed in this way, this project is articulated as not new or different, but an expanded project within AAFB. However, we believe it is important to note that as these projects are built out and expanded on, they establish a sense of permanency. Rarely, do these projects and the processes that support these proposed actions provide a plan for exiting or steps towards returning these lands to the original landowners. Many community members, particularly original landowners, express concern over how the land will be returned and restored to its original condition, given these significant alterations to the landscape. What are long-term and short-term plans to restore the land to its original condition should/when the area is returned to the ancestral landowners? As DAF fulfills the federal procedural requirements to expand, it is important to ask simultaneously: How will the land be reinstated as much as possible to its original condition for the ancestral landowners? Please take time to provide a plan for how the land will be returned and the conditions the land will be reinstated.</p>	<p>There is currently no planned date for cessation of activities under the Proposed Action. After implementing the Proposed Action, if a future date for cessation of activities is determined, or if the action changes in some manner in the future (i.e. additional aircraft, additional operations, additional personnel, etc.) then additional compliance with the National Environmental Policy Act and the DAF's Environmental Impact Analysis Process would be required.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023d	Cumulative	Although the DAF projects are described as separate from other ongoing military projects, such as the Marine Corps relocation, what is concerning is that the people of Guam are shouldering and continue to shoulder the proliferation of military development projects as a whole, not piecemeal. Thus, the impact of all military projects together on the community is extensive and ominous.	The Guam and CNMI military relocation is included as a reasonably foreseeable action with relevance to the Proposed Action and is included in the cumulative impacts analysis throughout Section 3 of the EIS.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023e	Proposed Action	<p>Incorporation of Relevant NEPA Documents</p> <p>It is stated in the Draft EIS that portions of the previously completed 2015 Mariana Islands Testing and Activities Environmental Impact Statement/Overseas Environmental Impact Statement and the 2020 Mariana Islands Testing and Training Activities Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement documents have been incorporated into the DAF Draft EIS because of its relevance to the proposed infrastructure upgrades at AAFB that would accommodate aircraft types and flight operations. Provided that these National Environmental Policy Act (NEPA) MITT documents and associated materials are incorporated into this DAF Draft EIS, we have the following questions/requests:</p> <ul style="list-style-type: none"> •What relevant concerns were raised by the community and the government agencies in the 2015 MITT EIS/OEIS and the 2020 MITT Supplemental EIS/OEIS? •Have these concerns been addressed in the current DAF Draft EIS? •If so, in what sections of the Draft EIS might these responses be found? •If they have not been addressed, I respectfully request that every effort be made to acknowledge the relevant concerns raised during the previous MITT public comment periods and incorporate them in the Final EIS to uphold the integrity and significance of the public review period for this proposed action. 	<p>Public input was received on the 2015 MITT EIS and 2020 MITT Supplemental EIS and considered prior to signing the RODs for those EISs. The point of incorporating those EISs by references is to streamline the NEPA document and not rehash analyses that have already been completed. All aircraft that currently fly from Andersen to the MITT study area are operating under the MITT NEPA documents and their authorizations.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023f	Public Review Period	<p>Public Meetings</p> <p>While these DAF actions are proposed to take place in the north of the island, we recommend that additional public meetings be held in the central and southern village centers so that the community as a whole, regardless of their proximity to AAFB, has the opportunity to attend these public meetings in order learn more about the proposal and participate if they choose to do so.</p> <p>In addition to the “open house” format at the public meetings, we strongly recommend that a DAF panel be present at the front of the room to deliver and a formal presentation as well as receive verbal comments provided by the public. Our communities place tremendous value on oral traditions and oral histories, and in previous EIS public hearings over the years, military leaders have not been present to acknowledge, receive, and listen to concerns raised by the people.</p>	<p>The meeting locations were decided upon based on community access for those communities most affected. The meetings were advertised in multiple local newspapers on multiple dates and coordinated with village mayors. The meeting format allowed all meeting participants to learn about the proposed action, speak with representatives from Andersen Air Force Base and subject matter experts, and to provide comments wither verbally, written, or via available computers networked to the project website.</p>
Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023g	Public Review Period	<p>There were numerous and significant concerns outlined in Appendix A: Public Scoping Comments by federal agencies, local Guam agencies and community organizations (e.g., US Environmental Protection Agency, Guam State Historic Preservation Officer, and Prutehi Litekyan – PLSR). It would benefit the entire community of Guam if these concerns as well as those outlined during the MITT comment periods are organized and presented during a Town Hall meeting so that the people of Guam are adequately informed of questions and concerns raised at the different levels and how they are addressed in the DEIS.</p>	<p>A town hall-style meeting to address comments from separate NEPA efforts is beyond the scope of this EIS and the NEPA process. Joint Region Marianas acts as the interface between DoD components and tenants through assigned regional installations on Guam and the Northern Mariana Islands and the civilian community.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023h	Public Review Period	Additionally, better and more collaborative efforts should be made with local agencies to engage on the analyses provided. Some of the Appendices are quite technical and warrant further explanation in language that is accessible to our lay communities and especially our elders.	Joint Region Marianas and the DAF coordinate with federal and Guam agencies multiple times throughout the NEPA process. The NEPA process is designed to ensure that federal agency decisions are environmentally sound and to encourage early consideration of environmental impacts by interested parties.
Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023i	Other	<p>Site Visits</p> <p>The DAF should work with the Guam Legislature and Government of Guam agencies to arrange a site visit to the impacted areas at AAFB for North Ramp, Munitions Storage Area-1 and the Beddown Area. Understandably, the Guam State Historic Preservation Officer, Guam Environmental Protection Agency and Guam Waterworks Authority Directors have concerns about the burial remains previously found in the proposed project areas as well as the impacts on the Northern Guam Lens Aquifer and noise pollution in the areas surrounding the proposed project.</p> <p>The briefings and site visits should explain the following:</p> <ul style="list-style-type: none"> •Why is the current AAFB airstrip not feasible for this project? •What sorts of upgrades are needed to use the current AAFB airstrip? •The impact of increased personnel at the installation, namely how many personnel? Where are they coming from? How long will they stay? Where will they stay? 	<p>Andersen AFB is consulted with Guam HPO by following the provisions of the existing <i>Programmatic Agreement among Commander, Navy Region Marianas, The Advisory Council on Historic Preservation, and the Guam Historic Preservation Officer, Regarding Navy Undertakings on the Island of Guam (2008)</i> (see Appendix C) which applies to all actions within the current Joint Region Marianas Area of Operations, including Andersen Air Force Base.</p> <p>Community leaders can request site visits through AAFB Public Affairs Office (671-366-2888 or 36wg.pa2@us.af.mil). Additional information is listed on the Andersen Air Force Base Public Affairs website at the following link: https://www.andersen.af.mil/Units/Wing-Staff-Agencies/Public-Affairs/Community-Outreach-Program-Copy/</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Therese M. Terlaje	Speaker, Guam Legislature	023j	Other/ Cultural Resources	<p>Further recommendations</p> <p>The DAF should better incorporate advancing the consideration of the Advisory Council on Historic Preservation (ACHP) Policy Statement on Indigenous Knowledge and Historic Preservation for addressing concerns raised during the public comment period. Details can be found here: https://www.achp.gov/digital-library-section-106-landing/achp-policy-statement-indigenous-knowledge-and-historic. While this DEIS is primarily in accordance with NEPA policies, the ACHP Policy Statement on Indigenous Knowledge helps provide a more comprehensive framework and understanding for many of the concerns, questions and issues raised by our people, our local agencies and our federal agency counterparts. As we further develop our responses to these proposed DoD actions, it is important that we all move towards an understanding of the cumulative impacts on our communities and our region as a whole so that decision-making is more inclusive and representative of our people and our relationship to our natural and cultural environments.</p>	<p>The DAF strives to incorporate Indigenous Knowledge into the process when applicable to area or situation. When received, this information is incorporated into historic preservation decision-making process as part of the overall NEPA and NHPA processes. It is primarily during the NEPA and NHPA consultation and comment processes that we encourage comments, sharing of knowledge, and welcome discourse with all segments of society, but particularly with groups or persons that may be affected by the proposed undertaking.</p>

NGO	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024a	Other	<p>On behalf of Prutehi Litekyan: Save Ritidian (PLSR), we submit the following comments on the Draft Environmental Impact Statement for the proposed F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base, Guam. Our organization, PLSR vehemently opposes this proposed action and the many adverse impacts it will have on our island and community. We are against the Department of the Air Force (DAF) proposal to beddown up to 12 RSAF F-15 fighter aircraft from Singapore, construct infrastructure projects at Andersen Air Force Base, including the North Ramp and Munitions Storage (MSA-1), and all related infrastructure operations and associated training exercises with this project. Prutehi Litekyan supports the No Action Alternative, in which the DAF would not beddown F-15 fighter aircraft or implement the infrastructure upgrades within the North Ramp or MSA-1 project areas. PLSR challenges all findings of no significant impacts to all areas including biological resources, cultural resources, socioeconomic, environmental justice, geology and soils, water resources, infrastructure and utilities, noise/noise pollution, air quality, health and safety, land use, recreation, transportation, hazardous wastes and materials, and other environmental considerations and “unavoidable adverse impacts.” The DEIS identifies numerous short-term, long-term, and permanent potential risks in these areas, but does not adequately justify the determination for no significant impacts. Any such determination reflects cultural insensitivity and disconnection to our island home that is intrinsic to our identities and lifeways as Indigenous Pacific Islanders. With the No Action</p>	<p>The NEPA process is designed to ensure that federal agency decisions are environmentally sound. The analysis in the EIS, agency consultations, and agency and public input were considered prior to making a decision. All Proposed Action construction and operations would follow federal, Guam, local, and military regulations and all required environmental management measures would be implemented. Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>
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				<p>Alternative, no harmful impacts would be expected to occur.</p> <p>We must also consider this proposal against a long established history of colonial violence, environmental racism, and numerous and enduring ecological destruction and violations of our human and Indigenous rights, including but not limited to loss of access to properties and fishing grounds, the destruction of native and endangered species, numerous cases of substantial contamination, and severe and permanent desecration of sacred sites and ancestral remains, all still occurring at several military construction and operation sites around the island.</p> <p>Our submission in opposition to the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base is centered on the following issues:</p> <ul style="list-style-type: none"> •Several Possible Impacts on Vital Resources, Community – environmental, cultural, and social. •Safety and Security •Critique on the Scoping Process <p>Prutehi Litekyan: Save Ridityan (PLSR): Established in 2017, PLSR is a community-based organization dedicated to protecting and preserving the natural and cultural resources of Guam. This includes the areas proposed to be used for relocating U.S. Marine Corps forces currently located in Okinawa, Japan to Guam, and for military live-fire training. PLSR’s members and network comprise of the indigenous CHamoru, the residents of Guam, allies, and concerned citizens with the interest of protecting the beliefs, the culture, the language, the air, the water, and the land of the CHamoru. More specifically, PLSR’s members comprise of traditional healers, fishermen, businesspeople, college students,</p>	
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				<p>farmers, teachers, social workers, cultural practitioners, and environmentalists. PLSR represents its members, in addition to 25,000 petition signatories, by actively engaging in the legislative, administrative processes and has consistently demonstrated a special interest in the areas of controversy. Since its inception, PLSR has organized more than 600 different actions, including letter-writing campaigns, public testimony, school visits, community rallies, comment drives, protests, tours, press conferences, and more.</p> <p>Accordingly, PLSR and its members have a direct interest in ensuring that federal actions and decisions do not harm or have a potential to harm the environment and the cultural resources and historical properties of the indigenous CHamoru people. These interests extend to environmental resources that could constitute as a historic and cultural property, including land, sources of water, and water bodies. DoD's environmental review in connection with actions and decisions that inadequately consider the effect of their undertaking on cultural resources would impair PLSR's interests. Thus, PLSR and its members have a significant interest in ensuring that (1) Guam's sole-source aquifer, air, and lands are protected for all future generations of Guam; (2) DoD fulfills its mandates under applicable federal laws and regulations to prevent the destruction or loss of cultural resources and historic properties; and (3) PLSR and its members have public access to information and appropriate supporting documentation regarding DoD's identification and evaluation efforts and findings, to provide the public opportunities to comment.</p>	
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024b	Biological Resources	<p>The clearing of vegetation and the survival of the fanihi or Marianas fruit bat are inherently connected. The clearing of cycas micronesica harms an important food source for the bats. The bats are also pollinators and they will also be driven from the site, thus impacting the survival of fruiting trees including the cycas micronesica. Disturbances from noise, light, and dust from construction and operations will drive out the existing roosting site that lies just 800 feet outside of the proposed project area and has been observed with mating pairs and pups. A potential increase of approximately 32 percent in aircraft operations above what these species have historically been exposed to will drive them out and the DEIS assumes that the bats will simply find another place to live. This is unacceptable. We would see a successful return of the local fanihi population with a decrease in military construction and operations. We do not agree with the determination that there are no significant impacts to the fanihi, which is an endangered and protected Native species. The following study discusses the fanihi and cycas micronesica connection:</p> <p>https://www.uog.edu/_resources/files/scholars-and-colleges/college-of-liberal-arts-and-social-sciences/pai/v11/09_pai11_demeulenaere.pdf</p> <p>https://www.uog.edu/news-announcements/2020-2021/2021-study-explores-loss-and-potential-restoration-of-chamoru-practices-tied-to-endangered-fadang-and-fanihi.php</p>	<p>Information and analysis on biological resources is included in Sections 3.4.1 and 3.4.2 of the EIS. Conservation measures to offset impacts from the Proposed Action were developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures include development of a habitat enhancement area. Conservation measures are detailed in the Biological Opinion, which is included in Appendix C.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024c	Biological Resources	<p>The clearing of vegetation and the survival of the fanihi or Marianas fruit bat are inherently connected. The clearing of cycas micronesica harms an important food source for the bats. The bats are also pollinators and they will also be driven from the site, thus impacting the survival of fruiting trees including the cycas micronesica. Disturbances from noise, light, and dust from construction and operations will drive out the existing roosting site that lies just 800 feet outside of the proposed project area and has been observed with mating pairs and pups. A potential increase of approximately 32 percent in aircraft operations above what these species have historically been exposed to will drive them out and the DEIS assumes that the bats will simply find another place to live. This is unacceptable. We would see a successful return of the local fanihi population with a decrease in military construction and operations. We do not agree with the determination that there are no significant impacts to the fanihi, which is an endangered and protected Native species. The following study discusses the fanihi and cycas micronesica connection:</p> <p>https://www.uog.edu/_resources/files/schools-and-colleges/college-of-liberal-arts-and-social-sciences/pai/v11/09_pai11_demeulenaere.pdf</p> <p>https://www.uog.edu/news-announcements/2020-2021/2021-study-explores-loss-and-potential-restoration-of-chamoru-practices-tied-to-endangered-fadang-and-fanihi.php</p>	Information and analysis on biological resources is included in Sections 3.4.1 and 3.4.2 of the EIS. Conservation measures to offset impacts from the Proposed Action were developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures could include development of a habitat enhancement area. Conservation measures are detailed in the Biological Opinion, which is included in Appendix C.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024d	Biological Resources	<p>Simply stating that a Biological Opinion will be authored and authorized to guide the mitigation of threatened species is not adequate, especially given how Department of Defense has a track record of violations of the Endangered Species Act in addition to not upholding its obligations to the Biological Opinion for the Marine Live-Fire Training Range Complex and Base. Please see below:</p> <p>https://biologicaldiversity.org/w/news/press-releases/lawsuit-seeks-to-protect-guams-endangered-species-from-construction-operation-of-us-marine-corp-base-2023-07-17/#:~:text=Today's%20lawsuit%2C%20filed%20in%20the,of%20the%20Endangered%20Species%20Act.</p> <p>https://news.mongabay.com/2019/05/to-save-a-forest-you-have-to-destroy-a-nicer-one-u-s-marines-target-forest-in-guam/#:~:text=The%20U.S.%20Marine%20Corps%20is,seed%20dispersal%20by%20native%20birds.</p>	The biological assessment and the associated Biological Opinion include conservation measures tailored to the proposed action. The conservation measures are detailed in the Biological Opinion issued by USFWS, which has been appended to the Final EIS.
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024e	Water Resources	<p>We have also witnessed how the massive clearings have made our coastlines, jungles, and fresh water more vulnerable in our recovery from Super Typhoon Mawar. Such clearing has impacted the recharge and natural protections of the Guam Northern Lens Aquifer, Guam's sole-source aquifer that provides the island with up to 90% of its drinking water. Clearing more land to construct the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base will make Guam more vulnerable to climate change and impact the security of clean drinking water.</p>	Weather stressor impacts are discussed in Section 3.11. While a total of approximately 192 acres would be disturbed, 96 acres would be revegetated. Construction of stormwater management infrastructure to minimize impacts to resources is described in Section 2.1.2.1.7.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024f	HazMat/ Water Resources	<p>PLSR opposes the placement of the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base, which is directly located over the islands sole source aquifer. There are tremendous risks for contamination from military jet fuel, the use of AFFF fire-fighting foam, and the distribution of PFAS/PFOS that is associated with such installments. Andersen Air Force Base already has an existing superfund site. The 20,000-acre site was placed on the National Priorities List in October 1992 due to the presence of hazardous substances associated with base operations. Hazardous substances include solvents such as trichloroethane (TCE) and paint thinners; dry cleaning fluids and laundry products; fuels such as JP-4 and gasoline; pesticides; antifreeze; aircraft cleaning compounds; polychlorinated biphenyls (PCBs); metals; and military munitions. These substances were found in unlined landfills, drum storage and disposal areas, chemical storage areas, fire training areas, waste storage areas, laundry facilities, and industrial and flight line operations. Andersen Air Force Base is in a karst limestone terrain and the Northern Guam Lens Aquifer (NGLA). The site's long-term cleanup is still ongoing (https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=0902825#bkground).</p>	<p>An evaluation of the potential impacts on the Northern Guam Lens Aquifer is provided in Section 3.8.2. Section 3.16.2 analyzes the potential impacts from hazardous materials and wastes including those from jet fuel use and storage, AFFF (which currently is not present at the North Ramp and MSA-1 project areas), and existing contamination sites, including those sites associated with PFAS.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024g	Water Resources/ Biological Resources	A reduction in vegetation and increase in impervious surface could alter hydraulic patterns. Vegetation clearing, soil compaction, and impervious surfaces would reduce infiltration and percolation of surface water to groundwater, and depressions may form that could serve to pond stormwater, increasing stormwater volume and velocity. An increase in stormwater volume and velocity could increase discharges into adjacent coastal waters where essential fish habitat (EFH) resources reside.	Essential fish habitat is discussed in Section 3.4.1.4.4 and analyzed in Section 3.4.2.1. Construction of stormwater management infrastructure to minimize impacts to resources is described in Section 2.1.2.1.7.
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024h	HazMat/ Biological Resources	During construction, EFH resources also could be affected in the unlikely event of accidental spills or leaks of fuel, lubricants, or other chemicals from construction equipment. Simply stating that a plan will be in place to address accidental fuel and chemical spills, fires and fire suppression, and storm water draining is not enough. The Department of Defense has a bad track record for mitigation and prevention of contamination here in Guam. We have 2 superfund sites and at least 70 other military toxic sites.	Section 3.8.2.1 includes a discussion of the potential impacts on essential fish habitat. Section 3.16.2.1 includes a discussion of the potential impacts from the use of hazardous materials during construction and notes the measures to be taken to manage spills or leaks.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024i	HazMat/ Water Resources	<p>PLSR is specifically concerned about the jet fuel receipt, storage, and distribution over the aquifer and how these chemicals and other hazardous materials will impact the health of the aquifer as well as other invaluable resources and historic properties. The DEIS does not allow for the discussion of the associated safety and health risks. Guam faced a jet fuel leak in 2017 that resulted in the destruction of 500 tons of soil. Also reflected in this incident, was the alarming level of under-reporting of such incidents to the public. It took several months for the military contractor to inform the Guam EPA of the spill:</p> <p>https://www.kuam.com/story/38846452/2018/08/Thursday/dod-contractor-fined-100k-by-guam-epa</p> <p>https://www.postguam.com/news/local/jet-fuel-spill-wasnt-reported-for-months-defense-contractor-fined/article_74663974-9c7d-11e8-9608-cb40bdef444e.html.</p>	<p>Impacts from hazardous materials and wastes—including potential fuel spills and leaks from the jet fuel receipt, storage, and distribution system—are discussed in Section 3.16.2.1. An evaluation of the potential impacts on the Northern Guam Lens Aquifer is provided in Section 3.8.2. The EIS has identified the regulations that will be followed and the permit requirements that will be implemented to avoid impacts on the Northern Guam Lens Aquifer and soils. The hydrant system fueling loop and fuel transfer pipeline that would be installed at the North Ramp would be fitted with leak detection technology that would notify the operator of a spill or leak. The DAF would amend the Andersen AFB SPCC Plan or develop a site-specific SPCC Plan to manage accidental spills or leaks.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024j	Air Quality	Training events associated with this project will also harm the health of our community and our resilience to the climate crisis. The addition of two training exercises per year at 4 weeks each will drastically upsurge air emissions, impacting air quality as well as soil and water quality as contaminants settle and deposit around the island and into the ocean and waterways. We do not agree that the impacts to air quality will be less than significant, given that there will still be an increase in the number of metric tons of carbon dioxide emissions due to this proposed action, increasing the social cost of carbon emissions for Guam by \$2,663,555.	GHG emissions from the proposed action are outlined in Section 3.11.2.1 of the EIS. This EIS examines GHGs as a category of air emissions. However, global and regional weather stressor models have substantial variation in output, and do not have the ability to measure the actual incremental impacts of a project on the environment; therefore, effects on air quality are only marginally determined based on the GHG emissions from the Proposed Action.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024k	Noise/ Environmental Justice	The additional training events will also exacerbate noise pollution caused solely by military activities. This equates to 2 months out of the year that the community will be exposed to intensified contamination and disruptive sound. We do not agree with the DEIS statement that noise impacts would be less than significant since operational noise from aircraft activities at the North Ramp may be disproportionately audible in Yigo, the most populated village, a community with environmental concerns as well as child and elderly populations. Increased noise pollution will harm individuals with noise sensitivities, including our elderly and veterans, as well pets and animals, including essential pollinators: endangered birds and bats. The amount of off-base land affected by the expanded noise contour would be approximately 811 acres, which would be an increase of 374 acres. This would include approximately 60 additional homes within the 65 dBA DNL.	Comment is predominately consistent with Section 3.10 of the EIS. There are no well-established or regulatory metrics or thresholds for determining significance with respect to aircraft noise exposure under NEPA. The determination that the proposed action would not introduce appreciable changes in land use and would have less-than-significant effects was made based on comparison to changes in noise from similar actions at other installations. For the majority of individuals, this change in the noise environment would be barely perceptible when compared to existing conditions, and limited to individuals living adjacent to the installation and directly under the approach and departure flight paths for a long established and active Air Force Base. Therefore, the determination of level of effects was not changed for the Final EIS. Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.

Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024I	Air Quality	<p>The training events will also consume an unsound amount of fossil fuel, thus increasing the military's overall emissions, and burdening islands already faced with dangerous incidents of climate catastrophe:</p> <p>Each training event could include an additional 12 F-15s for a total of 24 F-15s per training event, 1 tanker/refueling aircraft (e.g., KC-135s, KC46s, A-330s), and 1 early warning aircraft. Åß</p> <ul style="list-style-type: none"> - At cruising altitude, one F-15 will burn around 1,800 gallons of fuel an hour (https://static.e-publishing.af.mil/production/1/af_a3/publication/afpam10-1403/afpam10-1403.pdf). For 24 F-15, that equals 43,200 gallons per hour. - A tanker uses 1,720 gallons an hour (https://www.defenseone.com/ideas/2023/03/f-35a-engine-would-be-win-win-win-win/384467/). - The early warning air craft will use 438 gallons of fuel per hour (https://www.guardianjet.com/jet-aircraft-online-tools/aircraft-brochure.cfm?m=Gulfstream-G550-132). <p>Approximately 272,148 gallons of fuel would be needed for 24 F-15 planes, one tanker, and one early warning aircraft to cruise for just 6 hours in one day. For four days or 24 hours of flight, that equates to 1,088,592 gallons of fuel.</p> <p>In the first 20 years of this century, the military was responsible for 1.2 billion metric tons of greenhouse gas emissions; emitting more toxic gas than a majority of the world's countries. The Air Force and the Navy are two of the largest buyers of fossil fuels, purchasing \$4.9 billion and \$2.8 billion dollars' worth of fuel in 2017 alone, respectively.</p>	<p>The comment is consistent with the air quality assessment, as summarized in Section 3.11.2.1 of the EIS. Notably, GHG emissions presented on Table 3-32 include the burning of fossil fuels during the training events.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>(https://watson.brown.edu/costsofwar/files/cow/imce/papers/2019/Summary_Pentagon%20Fuel%20Use%2C%20Climate%20Change%2C%20and%20the%20Costs%20of%20War%20%281%29.pdf)</p> <p>https://earth.org/us-military-pollution/#:~:text=It%20established%20that%20if%20the,(GHG)%20in%20the%20world</p> <p>https://www.sciencedaily.com/releases/2019/06/190620100005.htm)</p>	
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024m	Socioeconomics/ Infrastructure	<p>There will be an estimated 500 construction workers, 286 ancillary employees, and another 106 indirect positions – or 892 employees each year. Therefore, increased traffic, demands on housing outside of the base, public safety, water distribution, sewer and wastewater management, and food access are issues of concern.</p>	<p>Impacts on transportation systems during construction and operation under the Proposed Action is addressed in Section 3.15.2 of the EIS. Impacts on housing demand are addressed in Section 3.6.2. Impacts on public safety are addressed in Section 3.12.2. Impacts on utilities, including potable water distribution, and sewer and wastewater systems are addressed in Section 3.9.2.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024n	Socioeconomics	Guam is currently facing a housing and labor shortage. The Marines have not yet been transferred from Okinawa, yet we are already witnessing a housing crisis because residents are being outpriced by military households for scarce affordable housing, along with escalations in construction costs for construction and labor. Long-term, adverse cumulative impacts from personnel as well as Enhanced Integrated Air and Missile Defense personnel and associated dependents would also result in an increased demand on the Guam housing market and an impact on public services such as healthcare due to additional personnel on island. Competition for labor and resources will impact construction, renovation, materials and labor for local/civilian homes. Economic benefits are only short-term. Military populations can affect the structure and growth of municipalities (villages) in Guam. Dededo and Yigo cover U.S. military-owned land and have a higher number of U.S. military residents relative to other municipalities. We do not agree with the finding of no significant impact for these issues.	The DAF recognizes the negative effects of military housing needs on local housing availability and affordability. The housing issues on Guam are a result of many complicated factors that are broader than this Proposed Action alone. Housing issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. The housing analysis in Sections 3.6.1 and 3.6.2 of the EIS was updated to include the most recent available housing information.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024o	Cultural Resources	In recent years, we have witnessed the continued desecration of ancestral burials, ancestral objects, sacred sites, and the removal of public access, all which impact the survival of Indigenous spiritual and cultural practices and ways of life. The clearing of land for the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base will ensure the continued desecration of burials, cultural resources, and sacred areas. Within the last decade, we have witnessed the destruction of over 1,000 acres of limestone forest and critical habitat, the removal of hundreds of significant material remains of our ancestors, and the desecration of at least 26 burials. We are witnessing the erasure of our heritage every day.	Section 3.5 of the EIS includes information and analysis on cultural resources including measures that would be taken to avoid impact on cultural resources or culturally significant areas. A cultural resources survey was conducted as part of the EIS process.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024p	Cultural Resources	We are disheartened to learn that a large number of sites and artifacts including several that are eligible for National Registry of Historic Properties are in the area of potential effect (APE) Twenty cultural resources are located within the 192-acre North Ramp APE. These include sites that have the potential to provide us with critical information about our CHamoru ancestors and the history of the northern plateau These include precontact ceramics with the potential for reconstructed vessels that could provide diagnostic data on the site's use, possible debris from earth ovens, a possible agricultural feature, and ancestral human remains. We do not want these material and ancestral remains to be disturbed through data recovery and especially demand that our ancestors be left in situ. We disagree with the determination that these sacred objects of our ancestors and other remains will have no significant impact from this proposed action.	As discussed in Section 3.5.2, the potential for unidentified cultural resources to be discovered during construction of the North Ramp is low. Inadvertent discoveries of artifacts may be possible in the MSA-1 APE within Site 66-08-2981. However, should inadvertent discoveries be made, the standard procedures outlined in the Andersen AFB Integrated Cultural Resources Management Plan would be followed. In the event of post-review discoveries, the DAF would comply with 36 CFR 800.13. The Andersen AFB Integrated Cultural Resources Management Plan includes a standard operating procedure for Inadvertent Discovery of Human Remains that closely aligns with the requirements of the Native American Graves Protection and Repatriation Act.
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024q	HazMat/ CZMA	The clearing of land for the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base will also expose and require the treatment of explosive ordinance. The military currently uses open detonation to treat these waste munitions, while further risking contamination to groundwater and air. We strongly disagree with the determination that "assessment is not applicable" for all potential risks for coastal zone resources.	Section 3.16.2.1 states construction is likely to encounter MEC (which includes explosive ordinance) and describes the procedures for its disposal and removal. Changes to MEC disposal practices are beyond the scope of this EIS.

Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024r	Military Presence	<p>Safety and Security: We are concerned that this project will make Guam and the Mariãna Islands a greater target for war, as the presence of the F-15 jets and related training exercises will position our islands as places of U.S. force projection in the region. War studies have shown that Guam will be devastated should the U.S. enter conflict with China, and we are now becoming a “first strike community”. A “Divert Airfield ” is also being built at the Tinian airport should Guam sustain an attack, further emphasizing and expanding the risk to the islands. (https://www.csis.org/analysis/first-battle-next-war-wargaming-chinese-invasion-taiwan).</p> <p>We oppose the use of this land for the purpose of preparing for war. The project is reported to take place on property already occupied by the Air Force and this land was condemned by eminent domain and the original inhabitants are withheld access. The military occupies almost 30% of the island and expanded activities within these properties further dispossessed Indigenous CHamorus of lands that are already occupied by the U.S. military.</p> <p>The F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base reflects the expansion of U.S. military occupation and dominance which threatens our sovereignty, our right to self-determine our political future, and the movement for decolonization for Guåhan. There is an established pattern of military construction and operations that continue to be carried out with a lack of free, prior, and informed consent and in violation of the Indigenous rights of the CHamoru people and other islanders who call Guam home.</p>	<p>Topics such as global military tensions, war experiences, military spending, military crime rates, federal land holdings, and decolonization are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making.</p> <p>The Draft EIS public comment period provided an indirect avenue for concerned citizens to inform decision makers about their views on such issues but discussion on such issues will not be included in the Final EIS or Record of Decision. However, this comment is an important contribution to the NEPA process and will be considered in the decision-making process.</p>
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Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024s	Public Safety	<p>It is also a known fact throughout the Asia Pacific region, that with amplified U.S. military exercises, also comes a rise in crime and sexual or gendered violence. The American Psychological Association has reported an estimated 25% increase of military sexual assaults since 2018 (https://www.apa.org/monitor/2024/03/military-sexual-assault-prevention-efforts#:~:text=within%20its%20ranks.-,The%20move%20comes%20after%20an%20estimated%2025%25%20increase%20in%20military,of%20People%20Analytics%2C%202023). However, DEIS fails to include this as a substantial potential risk for health and public safety. We are concerned with the risks of increased crime, and sexual and gendered violence that may result from the enlarged presence of military personnel for 2 months out of the year for the exercises associated with the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base. Many reports have shown that despite many efforts, sexual violence continues to rise in the U.S. military combined with a longstanding problem of: https://www.npr.org/2024/07/12/nx-s1-5035032/sexual-assault-cases-involving-u-s-military-personnel-strain-relations-with-japan#:~:text=ANTHONY%20KUHN%2C%20BYLINE%3A%20In%20court,Two%20have%20resulted%20in%20arrests. https://www.stripes.com/branches/marine_corps/2024-07-22/okinawa-troops-alleged-sex-crimes-14558062.html https://www.asahi.com/ajw/articles/15352930 https://theintercept.com/2021/10/03/okinawa-sexual-crimes-us-military/ https://www.militarytimes.com/news/your-military/2023/04/27/sexual-assault-in-the-</p>	<p>The Republic of Singapore Air Force (RSAF) has been training with F-15 fighter jets at Mountain Home Air Force Base in Idaho for 15 years with no reported increased crime rates. Any RSAF personnel would be subject to the same laws and standards of public conduct as all other people in Guam. Like civilians, all military personnel are required to follow federal, state, and local laws, as well as military laws. If an individual violates any law, they are subject to legal consequences that may include fines, imprisonment, or other penalties determined by the judicial system. Information may be available by contacting the Andersen Air Force Base Sexual Assault Response Coordinator (SARC) by using information at the following web link: https://www.andersen.af.mil/SARC/</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>military-keeps-rising-while-prosecutions-fall/ https://www.npr.org/2023/03/12/1162861309/military-academies-sexual-assault-survey https://www.hillandponton.com/facts-on-military-sexual-trauma-and-statistics/</p>	
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024t	Public Review Period	<p>Critique on the Scoping Process: Biological and cultural resource reports are not available in the appendices for this DEIS and are only made public after a formal request. Therefore, the information provided to the public on the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base made available online is grossly inadequate and provided in a manner that is negligent and harmful.</p>	<p>The biological and cultural resources survey reports were not included in the appendix of the EIS to reduce excessive paperwork and ensure the document was presented in a concise and publicly-digestible manner. Requests for materials can be made via email (afcec.aafb.infrasandf-15eis@us.af.mil) or postal mail at the address below. Postal Mail: HQ AFCEC/CIE Attn: Mr. David Martin Bldg. 171, 2261 Hughes Ave., Ste. 155 JBSA Lackland AFB, TX 78236-9853</p>
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024u	Alternatives	<p>The information provided does not discuss the details of the dismissal of five other potential alternative locations within the Pacific Air Forces area and the reasons why Andersen Air Force Base was selected out of the alternatives.</p>	<p>Section 2.2 of the EIS identifies all selection standards and alternatives considered. Rationale for the determination of impacts is discussed throughout Section 3 of the EIS.</p>
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024v	Public Review Period	<p>We attended both community meetings for this DEIS and there was no town hall style discussion which reflects a lack of cultural awareness and lack of appreciation for value of community members to engage and listen to each other.</p>	<p>The meeting format is dictated by the Joint Region Marianas command and is compliant with NEPA.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024w	Public Review Period	The timing of the scoping process is also distressing given that another comment period is also open for the Guam Flight Test. The public is being bombarded with comment deadlines and there is an unfair burden placed on community members to review provide and critical and substantively respond to the published materials, often without additional analysis from legal and scientific experts.	The MDA Flight Test proposed project is a separate project with a different proponent agency. Due to very tight project timelines it is frequently not possible to deconflict the timelines of separate projects due to separate agency priorities and mandates for project completion.
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024x	Other	Government of Guam agencies have also not had the capacity to share their analysis with each other or with the larger community.	Internal Guam government coordination is beyond the capability of the DAF. The DAF has coordinated with federal and Guam agencies multiple times throughout the EIS process.
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024y	Other	Public engagement is a requirement of the National Environmental Policy Act, and the lack of information and community conversation potentially constitutes violations of human rights and the indigenous rights of the Chamorro people, including but not limited to the right of free, prior, and informed consent, and the rights to life, health, food, culture, and an effective remedy. PLSR feels this process must be stopped, re-evaluated, and redirected to ensure the local voices are included to prioritize the protection of vital resources for the future generations of Guam.	The NEPA process is designed to ensure that federal agency decisions are environmentally sound and to encourage early consideration of environmental impacts by interested parties. The public scoping comment period and the Draft EIS public comment period provided an avenue for the public to express their views on the Proposed Action and the NEPA process. Although only comments received during the Draft EIS comment period are considered in the Final EIS, comments may be submitted at any time during the NEPA process. All comments are considered in the decision-making process.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024z	Military Presence	<p>In Closing: One F-15 costs about \$24,000 an hour to fly and about \$90 million to build. Instead of using this money to build up for war, the U.S. should focus its resources on housing, education, food and water security, and healthcare. https://www.defenseone.com/business/2023/11/f-15ex-price-tags-rise-boeing-hunts-ways-control-costs/391786/#:~:text=In%20September%2C%20when%20the%20Air,Force%20spokesperson%20Ann%20Stefanek%20confirmed https://www.businessinsider.com/price-military-aircraft-per-flight-hour-2016-8#f-15c-6</p> <p>War is not inevitable, and we oppose setting up our islands to once again be the stomping grounds for a conflict between imperial powers. We do not consent to the continued destruction, contamination, and desecration of our island for "national security." We do not consent to being collateral damage. We must demand genuine security, without the threat of contamination to our soil, air, and water, without the desecration of sacred sites and remains, without the erasure of our heritage, without the loss of important food resources and other threats to food security, with housing, and in peace without the threat of war. We demand that local, national, and international leadership on all sides prioritize peace, diplomacy, decontamination, and disarmament to prevent another war.</p>	Thank you for your correspondence. Your comment has been noted.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024aa	Unsubstantive	We repeat our passionate opposition to this proposal and our support for the No Action Alternative. Additionally, we also demand that the existing sites of contamination within the proposed project area be immediately cleaned up and remediated. Under the No Action Alternative for this proposal, the proposed F-15 beddown and infrastructure upgrades, as described in Section 2.1, would not occur. Specifically, the Department of the Air Force would not Beddown up to 12 RSAF F-15 fighter aircraft with anticipated arrival in 2029; conduct the proposed permanent RSAF F-15 aircraft operations; increase personnel at the installation; construct nor install the following infrastructure at the North Ramp: airfield pavements, aircraft hangar and maintenance facility, flightline maintenance facility and utility building, jet fuel receipt, storage, and distribution system extension, fencing and utilities extension, roadways and parking, stormwater management infrastructure, or construct nor install infrastructure within MSA-1 including three ECMs Pavements, stormwater management infrastructure, and temporary infrastructure to support construction.	Thank you for your correspondence. Your comment has been noted.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Prutehi Litekyan	Prutehi Litekyan Save Ritidian	024ab	Cumulative	<p>We still have not experienced all the impacts associated with the ongoing military expansion. We are already witnessing a housing crisis, a rise in crime, the loss of access to sacred areas, jungles to harvest medicines, critical fishing areas, and loss of access to family properties that were seized after World War II.</p> <p>For these reasons and more, PLSR passionately opposes the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base in Guam.</p>	<p>Issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam. Potential cumulative impacts that may occur when the impacts from Proposed Action are combined with the impacts of reasonably foreseeable actions with relevance to the Proposed Action are discussed throughout Section 3 of the EIS.</p>

Public	Alexander White	N/A	025a	Military Presence	<p>I am writing to express my strong opposition to the Department of the Air Force's (DAF) proposal to beddown up to 12 RSAF F-15 fighter aircraft from Singapore, construct infrastructure projects at Andersen Air Force Base, including the North Ramp and Munitions Storage (MSA-1), and all related infrastructure operations and associated training exercises with this project. I firmly support the No Action Alternative, where the DAF would neither beddown F-15 fighter aircraft nor implement the infrastructure upgrades within the North Ramp or MSA-1 project areas.</p> <p>I challenge all findings of no significant impacts in areas including biological resources, cultural resources, socioeconomic, environmental justice, geology and soils, water resources, infrastructure and utilities, noise/noise pollution, air quality, health and safety, land use, recreation, transportation, hazardous wastes and materials, and other environmental considerations and "unavoidable adverse impacts." Guåhan is already a colony of the United States that lacks agency over decisions affecting the use of the island's lands, air, and waters. This decision allows yet another foreign country to make use of the island as a war-resource without the consent of the island's residents.</p> <p>Allowing Singapore's F-15s to land on Guåhan will have negative impacts on the safety, environment, and efforts made by the indigenous people of Guåhan (CHamorus) to continue pursuing their inherent human right to become a self-determined people. Guåhan's long history as a staging ground for foreign warfare and training has already inflicted great harm on the island's indigenous population and the integrity of Guåhan's</p>	<p>Topics such as global military tensions, war experiences, military spending, military crime rates, federal land holdings, and decolonization are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making.</p> <p>The Draft EIS public comment period provided an indirect avenue for concerned citizens to inform decision makers about their views on such issues but discussion on such issues will not be included in the Final EIS or Record of Decision. However, this comment is an important contribution to the NEPA process and will be considered in the decision-making process.</p> <p>Due to January 20, 2025 Executive Order rescissions, the Environmental Justice section has been removed from the Final EIS.</p>
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Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
					<p>natural resources, which are still being depleted and contaminated at an alarming rate due to both commercial and military development.</p> <p>The beddown of Singapore F-15s at Andersen Air Force Base will make Guåhan a greater target for foreign attack and may contribute to dependence on foreign military forces while affecting decisions at Congressional levels that harm Guåhan's pursuit of sovereignty. Furthermore, allowing foreign military forces on Guåhan sets a precedent for future military cooperation and deployments on a small island whose local infrastructure is already struggling to support current military activities and is strained in anticipation of the realignment of Okinawan troops slated to be in full swing by December of 2024.</p>	
Duplicate	Alexander White	N/A	025b	Proposed Action (Purpose and Need)	<p>Guåhan's leaders are already scrambling to prepare the island to support U.S. forces in and coming to Guåhan, and there should be greater pause before allowing the beddown of Singapore F-15s to consider the logistics and costs associated with hosting foreign military aircraft.</p>	<p>Topics such as military spending are important issues but are outside the scope of NEPA and the EIS. Issues as a result of overall military buildup and potential solutions are being addressed at higher levels between Joint Region Marianas and the Government of Guam.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Alexander White	N/A	025c	Noise	<p>Concerns about existing Air Force activities in Guåhan villages, particularly from Northern residents who live near Andersen Air Force Base, include incidents of excessive noise pollution. The addition of Singapore F-15s will undoubtedly add to this existing problem. Other existing environmental concerns that will likely be made worse include the increase of carbon emissions and noises that disrupt native wildlife. Other concerns related to the increase in noise pollution are the effects these activities will have on the mental and physical health of individuals with noise sensitivities, including Guåhan's growing population of military veterans suffering from PTSD. The sounds emitted from military aircraft are proven to increase the heart rate, blood pressure, and risks of cardiovascular diseases for all residents, including children and household pets.</p>	<p>Some studies have been conducted to examine the non-auditory health effects of aircraft noise exposure, focusing primarily on stress response, blood pressure, birth weight, mortality rates, and cardiovascular health. Exposure to noise levels higher than those normally produced by aircraft in the community can elevate blood pressure and also stress hormone levels. However, the response to such loud noise is typically short in duration: after the noise goes away, the physiological effects reverse, and levels return back to normal. In the case of repeated exposure to aircraft noise, the connection is not as clear. The results of most cited studies are inconclusive, and it cannot really be stated that a causal link exists between aircraft noise exposure and the various types of non-auditory health effects that were studied.</p> <p>EO 13045, <i>Protection of Children from Environmental Health Risks and Safety Risks</i>, identification of child populations, and impacts on child populations is addressed in Sections 3.12.1.2, 3.12.1.4, and 3.12.2, respectively.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Alexander White	N/A	025d	Biological Resources	This proposed action will also permanently clear and destroy 96 acres of limestone forest, which will harm protected species including <i>Cycas micronesica</i> , <i>Tabernaemontana rotensis</i> , <i>Bulbophyllum guamense</i> , <i>Dendrobium guamense</i> , <i>Tuberolabium guamense</i> , Mariana fruit bat (<i>Pteropus mariannus mariannus</i>), and Micronesian starling (<i>Aplonis opaca guami</i>). I object to the clearing and relocation of <i>Cycas micronesica</i> , <i>Tabernaemontana rotensis</i> , <i>Tuberolabium guamense</i> , <i>Bulbophyllum guamense</i> , and <i>Dendrobium guamense</i> that occur within the project area and would be subject to removal as part of site clearing. We object to disturbances to the Marianas fruit bat and Micronesian starling.	Information and analysis on biological resources is included in Sections 3.4.1 and 3.4.2 of the EIS. Conservation measures to offset impacts from the Proposed Action were developed in consultation with the USFWS under Section 7 of the ESA. These conservation measures include development of a habitat enhancement area. All conservation measures are detailed in the Biological Opinion, which is included in Appendix B.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Alexander White	N/A	025e	Cultural Resources	There are also several sites that are eligible for the National Registry of Historic Properties that are in the area of potential effect (APE). These include ceramics with the potential for reconstructed vessels that could provide diagnostic data on the site's use, possible debris from earth ovens, a possible agricultural feature, and ancestral human remains. We do not want these materials and ancestral remains to be disturbed through data recovery and especially demand that our ancestors be left in situ. We disagree with the determination that these sacred remains of our ancestors and objects will have no significant impact from this proposed action.	As discussed in Section 3.5.2, the potential for unidentified cultural resources to be discovered during construction of the North Ramp is low. Inadvertent discoveries of artifacts may be possible in the MSA-1 APE within Site 66-08-2981. However, should inadvertent discoveries be made, the standard procedures outlined in the Andersen AFB Integrated Cultural Resources Management Plan would be followed. In the event of post-review discoveries, the DAF would comply with 36 CFR 800.13. The Andersen AFB Integrated Cultural Resources Management Plan includes a standard operating procedure for Inadvertent Discovery of Human Remains that closely aligns with the requirements of the Native American Graves Protection and Repatriation Act.
Duplicate	Alexander White	N/A	025f	Cultural Resources	There will be an estimated 500 construction workers, 286 ancillary employees, and another 106 indirect positions – or 892 employees each year. Therefore, increased traffic, demands on housing outside of the base as well as labor, public safety, water distribution, sewer and wastewater management, and food access are issues of concern. Guam is currently facing a housing and labor shortage with a great percentage of resources already diverted to military construction and operations.	Impacts on transportation systems during construction and operation under the Proposed Action is addressed in Section 3.15.2 of the EIS. Impacts on housing demand and labor capacity are addressed in Section 3.6.2. Impacts on public safety are addressed in Section 3.12.2. Impacts on utilities, including potable water distribution, and sewer and wastewater systems are addressed in Section 3.9.2.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Alexander White	N/A	025g	Other	<p>Biological and cultural resource reports are not readily available online or in the appendices for this Draft Environmental Impact Statement and are only made public after a formal request. Therefore, the information provided to the public on the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base made available online is grossly inadequate and provided in a manner that is negligent and harmful.</p> <p>For these reasons and more, I oppose the F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base in Guam and support the No Action Alternative.</p>	<p>The biological and cultural resources survey reports were not included in the appendix of the EIS to reduce excessive paperwork and ensure the document was presented in a concise and publicly-digestible manner.</p> <p>Requests for materials can be made via email (afcec.aafb.infrasandf-15eis@us.af.mil) or postal mail at the address below.</p> <p>Postal Mail: HQ AFCEC/CIE Attn: Mr. David Martin Bldg. 171, 2261 Hughes Ave., Ste. 155 JBSA Lackland AFB, TX 78236-9853</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Kaeli Swift	N/A	026	Military Presence	I am writing to express my concern over AAFB F-15. I do not believe a thorough enough job has been done to communicate the cultural and environmental impacts of this decision. Furthermore, the stationing of fighter jets on Guam would exacerbate tensions with foreign adversaries and make Guam a target. While military leaders have rejected language that Guam is a "first strike community" the actions the DOD is currently taking on Tinian shows they know the truth perfectly well. The whole reason for the Tinian divert airfield project is to create a safety net should Guam come under attack. That's been explicitly said in community meetings with DOD representatives. You cannot have it both ways. You cannot compel the people of Tinian to put up with the major land use changes the DOD is currently undertaking while also telling the people of Guam that the build up there does not put their safety at risk. Beyond people the stationing and use of fighter jets has demonstrable negative impacts to air quality and wildlife. I reject this proposal.	Topics such as global military tensions are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making. The Draft EIS public comment period provided an indirect avenue for concerned citizens to inform decision makers about their views on such issues but discussion on such issues will not be included in the Final EIS or Record of Decision. However, this comment is an important contribution to the NEPA process and will be considered in the decision-making process.
Public	Tewid Meresbang	N/A	027a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Tewid Meresbang	N/A	027b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Tewid Meresbang	N/A	027c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Tewid Meresbang	N/A	027d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Tewid Meresbang	N/A	027e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Tewid Meresbang	N/A	027f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Tewid Meresbang	N/A	027g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Maggie	N/A	028	Military Presence	I am not ok with this project. This project would not only pose environmental challenges, but also safety concerns for Guam. The indigenous people of Guam are not ok with this, and after so many years of the United States using indigenous land for testing and military bomb testing, it needs to stop. Look at what happened to land in southwest America that was indigenous land after the united states used it as a testing ground. This is not a suitable choice.	Topics such as military presence are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making. The Draft EIS public comment period provided an indirect avenue for concerned citizens to inform decision makers about their views on such issues but discussion on such issues will not be included in the Final EIS or Record of Decision. However, this comment is an important contribution to the NEPA process and will be considered in the decision-making process.
Public	Toni Brooks	USAF Veteran	029a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Toni Brooks	USAF Veteran	029b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Toni Brooks	USAF Veteran	029c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Toni Brooks	USAF Veteran	029d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Toni Brooks	USAF Veteran	029e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Toni Brooks	USAF Veteran	029f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Toni Brooks	USAF Veteran	029g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
NGO	Prutehi Litekyan	Prutehi Litekyan - Save Ritdian	030	N/A	Comment 030 (submitted via web comment form) is identical to Comment 024 (submitted via email).	See response to Comment 024.
Public	Melissa Tomlinson	N/A/	031a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Melissa Tomlinson	N/A/	031b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Melissa Tomlinson	N/A/	031c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Melissa Tomlinson	N/A/	031d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Melissa Tomlinson	N/A/	031e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Melissa Tomlinson	N/A/	031f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Melissa Tomlinson	N/A/	031g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Allan Santos	N/A	032	Military Presence	<p>My name is Allan Santos, I'm reaching out to you to express my concerns about the dangers of stationing Singapore Military F-15s on Guam. I urge that you cease plans to station Singapore Military F-15s on Guam. The locals refuse to be a 1st strike Island target with tensions in our region becoming more hostile, at the hands of the Military macho chest puffing.</p> <p>We seek peace, de-escalation, demilitarization & diplomatic strategies to keep the safety, & security of the locals, & our natural resources on our island home our priority.</p> <p>Guam being a small island, has fragile limited natural resources, & years of Military occupation have desecrated these resources. The Military continues to ignore concerns about environmental impact, not just on island, but the ocean around us.</p> <p>Cease all plans to station these F-15s, demilitarize, deescalate, this plan will have tremendous negative effects on Guam's already challenged infrastructures, will wreak havoc on Guam's already fragile, threatened environment, & native endangered fauna, & floral species.</p> <p>Guam does not want to be the pawn in a possible war that we have no responsibility in initiating.</p> <p>The U.S. military has taken enough, & has done enough damage to my island.</p> <p>Do what's right, cease plans to station these war machines on our island home.</p> <p>I fully support the decolonization, & self determination of my island home, & her people.</p>	<p>Topics such as global military tensions, war experiences, federal land holdings, and decolonization are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making.</p> <p>The Draft EIS public comment period provided an indirect avenue for concerned citizens to inform decision makers about their views on such issues but discussion on such issues will not be included in the Final EIS or Record of Decision. However, this comment is an important contribution to the NEPA process and will be considered in the decision-making process.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
NGO	Prutehi Litekyan	Prutehi Litekyan - Save Ritdian	033	Unsubstantive	Hafa Adai Allan! Thank you so much for all of your comments!	Thank you for your correspondence. Your comment has been noted.
Public	Allan Santos	N/A	034	N/A	Comment 034 (submitted via email) is identical to Comment 032 (submitted via email).	See response to Comment 032.
Public	Sterling Corbin	N/A	035a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Sterling Corbin	N/A	035b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Sterling Corbin	N/A	035c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Sterling Corbin	N/A	035d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Sterling Corbin	N/A	035e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Sterling Corbin	N/A	035f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Sterling Corbin	N/A	035g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Andrea Quitugua	N/A	036a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Andrea Quitugua	N/A	036b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Andrea Quitugua	N/A	036c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Andrea Quitugua	N/A	036d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Andrea Quitugua	N/A	036e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Andrea Quitugua	N/A	036f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Andrea Quitugua	N/A	036g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Alexander "Taddong" White	N/A	037	N/A	Comment 037 (submitted via email) is identical to Comment 025 (submitted via web comment form).	See response to Comment 025.
Public	Karinne Dadigan	N/A	038a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Karinne Dadigan	N/A	038b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Karinne Dadigan	N/A	038c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Karinne Dadigan	N/A	038d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Karinne Dadigan	N/A	038e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Karinne Dadigan	N/A	038f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Karinne Dadigan	N/A	038g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Esther Raposa	N/A	039a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Esther Raposa	N/A	039b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Esther Raposa	N/A	039c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Esther Raposa	N/A	039d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Esther Raposa	N/A	039e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Esther Raposa	N/A	039f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Esther Raposa	N/A	039g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Joleen Manibusan	N/A	040a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Joleen Manibusan	N/A	040b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Joleen Manibusan	N/A	040c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Joleen Manibusan	N/A	040d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Joleen Manibusan	N/A	040e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Joleen Manibusan	N/A	040f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Joleen Manibusan	N/A	040g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Sydney Brusewitz	N/A	041a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Sydney Brusewitz	N/A	041b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Sydney Brusewitz	N/A	041c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Sydney Brusewitz	N/A	041d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Sydney Brusewitz	N/A	041e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Sydney Brusewitz	N/A	041f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Sydney Brusewitz	N/A	041g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Tewid Meresbang	N/A	042	N/A	Comment 042 (submitted via email) is identical to Comment 027 (submitted via web comment form)	See response to Comment 027.
Public	Silver Crable	N/A	043a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Silver Crable	N/A	043b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Silver Crable	N/A	043c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Silver Crable	N/A	043d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Silver Crable	N/A	043e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Silver Crable	N/A	043f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Silver Crable	N/A	043g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Dakota Camacho	N/A	044	Military Presence	<p>I oppose the Department of the Air Force's (DAF) proposal to beddown up to 12 RSAF F-15 fighter aircraft from Singapore, construct infrastructure projects at Andersen Air Force Base, including the North Ramp and Munitions Storage (MSA-1), and all related infrastructure operations and associated training exercises with this project.</p> <p>I am unsatisfied with the current EIS which does not provide adequate information on how the proposed action would impact our biological and cultural heritage.</p> <p>You have no right to further militarize our land before we exercise our full rights to self-determination. The proposed action is a violation of our international human rights and the natural laws of Ináfa'maolek.</p>	<p>Information and analysis on biological and cultural resources are included in Sections 3.4 and 3.5 of the EIS.</p> <p>Topics such as global military tensions, federal land holdings, and decolonization are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making.</p> <p>The Draft EIS public comment period provided an indirect avenue for concerned citizens to inform decision makers about their views on such issues but discussion on such issues will not be included in the Final EIS or Record of Decision. However, this comment is an important contribution to the NEPA process and will be considered in the decision-making process.</p>
Public	Colleen Weller	N/A	045a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Colleen Weller	N/A	045b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Colleen Weller	N/A	045c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Colleen Weller	N/A	045d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Colleen Weller	N/A	045e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Colleen Weller	N/A	045f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Colleen Weller	N/A	045g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Koohan Paik-Mander	N/A	046	Military Presence	<p>NO to stationing Singapore fighter jets on Guam!</p> <p>The People of the Pacific do NOT WANT A WAR WITH CHINA. STOP BUILDING A GENOCIDE ECONOMY WITH YOUR WAR INFRASTRUCTURE!!</p> <p>Here are just a few reasons I OPPOSE stationing Singapore F-15s on Guam:</p> <p>Cultural and biological resource reports are not available in the Draft Environmental Impact Statement.</p> <p>IMPACTS ON VITAL RESOURCES:</p> <ul style="list-style-type: none"> - Harmful impacts to the Marianas Fruit Bat, Micronesian Starling, cycads, orchids, and trees. - Risks for water contamination, air and noise pollution. - Desecration of sites eligible for the National Registry of Historic Properties including ancestral remains, ceramics, possible agricultural features and earth ovens, and other evidence about the Northern Plateau. <p>SAFETY AND SECURITY:</p> <ul style="list-style-type: none"> - Increased traffic, housing issues, and burdens on public services with the increased population flux. - Positioning Guam to be a “first strike community” and “collateral damage” in a conflict of imperial powers, impacting overall sovereignty. 	<p>The biological and cultural resources survey reports were not included in the appendix of the EIS to reduce excessive paperwork and ensure the document was presented in a concise and publicly-digestible manner.</p> <p>Requests for materials can be made via email (afcec.aafb.infrasandf-15eis@us.af.mil) or postal mail at the address below.</p> <p>Postal Mail: HQ AFCEC/CIE Attn: Mr. David Martin Bldg. 171, 2261 Hughes Ave., Ste. 155 JBSA Lackland AFB, TX 78236-9853</p> <p>Information and analysis on special status species is included in Section 3.4.1 of the EIS. Impacts on water resources, noise, and air quality are discussed in Sections 3.8, 3.10. and 3.11 of the EIS, respectively. Impacts on cultural resources are discussed in Section 3.5 of the EIS. Impacts on transportation systems and housing are discussed in Sections 3.15 and 3.6 of the EIS, respectively.</p> <p>Topics such as global military tensions are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making.</p>

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Local Political	Sabina Flores Perez	Senator, 37th Guam Legislature	047	N/A	[Comment 047 contains revisions to Comment 017. Revisions are reflected in Comment 017.] Apologies. Provided are revisions to the public comment, as the originally sent comment had some syntax errors. Below are the outlined changes: •correction of spelling of "fadang", which was originally misspelled as "fandango" on page 3, paragraph 1. •correction of syntax error where wording of "lower" was corrected to "higher" on page 4, paragraph 3.	See response to Comment 017.
Public	Maria Cristobal	N/A	048a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Maria Cristobal	N/A	048b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Maria Cristobal	N/A	048c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Maria Cristobal	N/A	048d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Maria Cristobal	N/A	048e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Maria Cristobal	N/A	048f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Maria Cristobal	N/A	048g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Public	Nedi McKnight	N/A	049	Military Presence/ Cumulative	<p>Gentlepersons, I write respectfully as a fellow human inhabitant of the Pacific Region. Increasing tensions in the Pacific region does not serve any purpose. The US does not need to go to war with China. Rather, we need to invest in our people and our environment, so that we can compete. Imagine if we put all this funding and efforts into collaboration with like-minded countries to improve the world around us. Any further build up of military on Guam will impact residents, environment, species and vital resources.</p> <ul style="list-style-type: none"> - Harmful impacts to the Marianas Fruit Bat, Micronesian Starling, cycads, orchids, and trees. - Risks for water contamination, air and noise pollution. - Desecration of sites eligible for the National Registry of Historic Properties including ancestral remains, ceramics, possible agricultural features and earth ovens, and other evidence about the Northern Plateau. - Increased traffic, housing issues, and burdens on public services with the increased population flux. - Positioning Guam to be a “first strike community” and “collateral damage” in a conflict of imperial powers, impacting overall sovereignty. 	<p>Information and analysis on special status species is included in Section 3.4.1 of the EIS. Impacts on water resources, noise, and air quality are discussed in Sections 3.8, 3.10, and 3.11 of the EIS, respectively. Impacts on cultural resources are discussed in Section 3.5 of the EIS. Impacts on transportation systems and housing are discussed in Sections 3.15 and 3.6 of the EIS, respectively.</p> <p>Topics such as global military tensions and military spending are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making.</p>
Public	Richelle Swarts	N/A	050a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Richelle Swarts	N/A	050b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Richelle Swarts	N/A	050c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Richelle Swarts	N/A	050d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Richelle Swarts	N/A	050e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Richelle Swarts	N/A	050f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Richelle Swarts	N/A	050g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Topher Dean	N/A	051	Unsubstantive	<p>Please, stop poking China! You're like one of these guys who likes to go to bars and bump into people, hoping to get into a fight. Are you that insecure that you feel the need to prove your manliness by pushing China into a global thermonuclear conflagration????!!!! Please, stop your build up in the Pacific.</p> <p>I'm going to tell you something you're probably unaware of, Earth is a finite sphere. Competing with China, or anyone, for the dregs of Earth's dwindling resources can only lead to complete and total annihilation of all life on Earth. Instead of this military crap, go to China and talk about this simple fact, competing for a finite supply of resources is death, FOR EVERYONE. I'm Sure Xi Jiping will agree. We need to work together, share, help each other, and be kind to each other.</p> <p>PLEASE!!!!</p>	<p>Topics such as global military tensions are important issues but are outside the scope of NEPA and the EIS. National and local security is an important topic that is considered in all DoD decision making.</p> <p>The Draft EIS public comment period provided an indirect avenue for concerned citizens to inform decision makers about their views on such issues but discussion on such issues will not be included in the Final EIS or Record of Decision. However, this comment is an important contribution to the NEPA process and will be considered in the decision-making process.</p>
Public	Isa Arriola	N/A	052a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Isa Arriola	N/A	052b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Isa Arriola	N/A	052c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Isa Arriola	N/A	052d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Isa Arriola	N/A	052e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Isa Arriola	N/A	052f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Isa Arriola	N/A	052g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Teresa Lagunaña	N/A	053a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Teresa Lagunaña	N/A	053b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Teresa Lagunaña	N/A	053c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.
Duplicate	Teresa Lagunaña	N/A	053d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Teresa Lagunaña	N/A	053e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Teresa Lagunaña	N/A	053f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Teresa Lagunaña	N/A	053g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.
Public	Teresa Lagunaña	N/A	054	N/A	Comment 054 (submitted via email) is identical to Comment 053 (submitted via email).	See response to Comment 053.
Public	Hurao Pablo-Cook	N/A	055a	Military Presence	Duplicate of form letter. Identical to Comment 025a.	See response to Comment 025a.
Duplicate	Hurao Pablo-Cook	N/A	055b	Proposed Action (Purpose and Need)	Duplicate of form letter. Identical to Comment 025b.	See response to Comment 025b.
Duplicate	Hurao Pablo-Cook	N/A	055c	Noise	Duplicate of form letter. Identical to Comment 025c.	See response to Comment 025c.

Contact Type	Name	Organization	Comment ID	Theme(s)	Comment	Response
Duplicate	Hurao Pablo-Cook	N/A	055d	Biological Resources	Duplicate of form letter. Identical to Comment 025d.	See response to Comment 025d.
Duplicate	Hurao Pablo-Cook	N/A	055e	Cultural Resources	Duplicate of form letter. Identical to Comment 025e.	See response to Comment 025e.
Duplicate	Hurao Pablo-Cook	N/A	055f	Socioeconomics	Duplicate of form letter. Identical to Comment 025f.	See response to Comment 025f.
Duplicate	Hurao Pablo-Cook	N/A	055g	Other	Duplicate of form letter. Identical to Comment 025g.	See response to Comment 025g.

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APPENDICES

Appendix B: Biological Resources Analysis Supporting Documentation



ENVIRONMENTAL IMPACT STATEMENT for
F-15 BEDDOWN and INFRASTRUCTURE UPGRADES
at ANDERSEN AIR FORCE BASE, GUAM

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Appendix B: Biological Resources Analysis Supporting Documentation

B-1. Endangered Species Act Section 7 Consultation Summary	B-1
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B-1. Endangered Species Act Section 7 Consultation Summary

Table B-1 provides a summary of Section 7 consultation.

Table B-1. Summary of Consultation Actions with U.S. Fish and Wildlife Services under Section 7 of the Endangered Species Act

Date	Consultation Action
4/20/2021	The DAF issued a Notice of Intent (Vol. 86, No. 74 Federal Register, 20487, April 20, 2021) to prepare an <i>EIS for Infrastructure Upgrades at Andersen AFB</i> .
7/6/2021 through 9/17/2021	The DAF completed a biological resources survey from July 6 through September 17, 2021 (ChST), within the MSA-1 and North Ramp construction footprints to support the initial <i>EIS for Infrastructure Upgrades at Andersen AFB</i> .
12/4/2023	The DAF submitted a meeting request for early coordination for anticipated formal Section 7 consultation to the USFWS Pacific Islands Fish and Wildlife Office.
12/14/2023	The USFWS, DAF, and JRM held an initial coordination meeting and discussed the project overview, natural resources survey plan, formal consultation process, and species to be addressed in the Biological Assessment.
12/15/2023	The DAF issued a Notice of Intent (Vol. 88, No. 240 Federal Register 27166, December 15, 2023) to prepare an <i>EIS for F-15 Beddown and Infrastructure Upgrades at Andersen AFB</i> .
12/18/2023 through 3/21/2024	The DAF completed a biological resources survey from December 18, 2023, through March 21, 2024 (ChST), within the MSA-1 and North Ramp construction footprints, to confirm the presence of federally listed plants and assess general health following Typhoon Mawar in May 2023.
3/13/2024	The USFWS, DAF, and JRM held a coordination meeting to provide a high-level review of the key points in the draft Biological Assessment and gather USFWS input.
4/19/2024	The DAF submitted the draft Biological Assessment to USFWS.
5/16/2024	The USFWS, DAF, and JRM held a teleconference meeting to review USFWS comments on the Draft Biological Assessment for subject project and identify next steps for initiating formal consultation.
7/2/2024	The USFWS, DAF, and JRM held a teleconference meeting to discuss USFWS questions on the Draft Biological Assessment and consistency with the subject project EIS biological resources section to initiate formal consultation.
7/5/2024	The DAF submitted the Biological Assessment to USFWS to initiate formal consultation.
8/13/2024	The USFWS, DAF, and JRM held a teleconference meeting to discuss the approach to extirpated species for all Guam consultations and AAFB biosecurity programs. DAF/JRM confirmed a supplemental biological assessment will be submitted to address extirpated species.
9/5/2024	USFWS provided the DAF/JRM the acknowledgment letter of initiation of formal consultation to be concluded by November 15, 2024 with a cover letter and a request to provide a supplemental biological assessment addressing extirpated species [sihek (Guam kingfisher; <i>Todiramphus cinnamominus</i>), Åga (Mariana crow; <i>Corvus kubaryi</i>), and ko'ko' (Guam rail; <i>Gallirallus owstoni</i>)] and additional information on DAF/JRM biosecurity measures.
9/27/2024	The DAF submitted additional biosecurity information and a supplemental Biological Assessment to USFWS.

Date	Consultation Action
12/4/2024	USFWS provided DAF/JRM the draft Biological Opinion.
12/17/2024	USFWS provided DAF/JRM the second draft Biological Opinion.
12/18/2024	DAF/JRM provided comments on the draft Biological Opinion.
1/10/2025	DAF/JRM provided comments on the second draft Biological Opinion.
2/26/2025	USFWS issued the Final Biological Opinion to DAF/JRM.

Key: AFB = Air Force Base; ChST = Chamorro Standard Time; DAF = Department of the Air Force; EIS = Environmental Impact Statement; JRM = Joint Region Marianas; MSA-1 = Munitions Storage Area 1; USFWS = U.S. Fish and Wildlife Service

B-2. Summary of Natural Resources Conservation Measures

A summary of the conservation measures that DAF will implement to reduce adverse impacts to protected species include:

- Ensure that the Proposed Action is implemented as described in the Biological Opinion.
- Administer a contractor education program to ensure contractor personnel working at the project site are informed of the biological resources within the construction footprint, including ESA-listed species, invasive species, special status species, avoidance measures, and reporting requirements.
- Prior to vegetation clearing, perform a field assessment, by a qualified biologist, of construction footprints and a 10-foot (3-meter) buffer to map the locations of all threatened and endangered species, including home/host plant locations. Determine the current number of individuals and health status assessment of *Cycas micronesica*, *Tabernaemontana rotensis*, *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense* that cannot be avoided within the construction footprint. Determine how many individuals can be salvaged through seed collection, plant part salvage, and/or whole plant salvage.
- Designate a 151-ac (61-ha) forest enhancement area in Tarague, including a survey, work plan, planting of native plant species as well as removal of invasive plant species and ungulates.
- Seed collection, salvage, transplant, and maintenance to support native forest habitat enhancement. Seeds from native trees within the construction footprints will be collected, germinated, propagated, and transplanted within the forest enhancement area. Individual orchids will be salvaged and transplanted to a conservation area. Using methods described in the plant salvage and transplant work plan, ESA-listed species *Cycas micronesica*, *Tabernaemontana rotensis*, *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense* will be salvaged from the construction footprint. The ESA-listed plant species that are not salvaged within 10 ft (3 m) of the construction perimeter will be monitored once every 6 months during site preparation and construction activities.
- Awareness training to prevent disturbance to Mariana fruit bat (*fanihi*, *Pteropus mariannus mariannus*) during site preparation and construction will be delivered to the contractor during an in-person meeting.

- During nighttime work, contractor personnel will be responsible for performing biological monitoring on site while nighttime work is underway to observe for Mariana fruit bat.
- Brown treesnake traps will be deployed on the perimeter fencing of the North Ramp and will be monitored and maintained for 20 years following installation of those fences.
- Little fire ant surveys will be performed at established entry points into the 151-ac (61-ha) forest enhancement area. Following the 5 years of surveys, long-term management of this invasive species will be addressed by the commitment in the JRM Integrated Natural Resources Management Plan (INRMP) to annually survey high-risk areas for little fire ant using established protocols.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

In Reply Refer To:
01EPIF00-2025-0055727

February 25, 2025

Mr. David Martin
NEPA Program Manager
Department of the Air Force Air Force Civil Engineer Center
2261 Hughes Ave, Suite 155
Joint Base San Antonio
Lackland, TX 78236-9853

Subject: Biological Opinion for Expansions of Aircraft Operations Area at Northwest Field, and Munitions Storage Area (MSA-1), Andersen Air Force Base, Guam

Dear Mr. Martin:

This document transmits the U.S. Fish and Wildlife Service's (USFWS) DRAFT biological opinion based on our review of the proposed expansion of the aircraft operations area at Northwest Field, and munitions storage area (MSA-1), Andersen Air Force Base, Guam, and its effects threatened fanihi (Mariana fruit bat, *Pteropus mariannus mariannus*), *Cycas micronesica* (fadang), *Tabernaemontana rotensis*, and three orchid species (*Bulbophyllum guamense* (cebello halumtano), *Dendrobium guamense*, and *Tuberolabium guamense*) pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Although the endangered sihek (Guam kingfisher, *Todiramphus cinnamominus*), åga (Mariana crow, *Corvus kubaryi*), and ko'ko' (Guam rail, *Gallirallus owstoni*) do not currently exist in the wild on Guam, this document also addresses the effects of the proposed action on the survival and recovery of the species. The Naval Facilities Engineering Systems Command Marianas is leading interagency coordination; we received your request for formal consultation on July 5, 2024.

This biological opinion is based on information provided in your July 2024, *Biological Assessment for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base (AFB), Guam (Headquarters Pacific Air Forces Joint Base Pearl Harbor-Hickam 2024)* (BA), your September 27, 2024, *Supplement to the Biological Assessment for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base (AFB), Guam (PACAF 2024)* addressing

PACIFIC REGION 1

Idaho, Oregon*, Washington,
American Samoa, Guam, Hawaii, Northern Mariana Islands

*PARTIAL

impacts the proposed action would have to the three extirpated species, and your September 27, 2024, letter, which provided the following additional information about invasive species aspects of the proposed action:

The USFWS requested supplemental information on the origins and stopover locations and durations of items that will be moved to or from Guam during project implementation. As described in the Proposed Action provided in the Biological Assessment submitted on July 5, 2024, the Department of the Air Force (DAF) will permanently beddown (station) up to 12 F-15 fighter aircraft at Andersen AFB. This will include a single introduction of new aircraft, that will be inspected in accordance with established biosecurity protocols upon their arrival in Guam. Similar to aircraft and materials for training exercises, inspections at the point of origin are subject to operational plans and are not included as part of this Proposed Action.

Additionally, the PIFWO requested that DAF describe how existing biosecurity programs will scale to implement biosecurity measures for both the construction and implementation components of the proposed action. Andersen AFB has confirmed that, as part of the Proposed Action, incoming materials and aircraft will be inspected as part of the Joint Region Marianas biosecurity program and will be subject to the *Brown Treesnake and Biosecurity Management Strategy for Training Activities within Guam & Commonwealth of the Northern Mariana Islands*. This program is currently scaled to respond to inspection needs for all training events and can accommodate the one-time event for the addition of up to 12 aircraft, and following beddown, aircraft and cargo will not have movements to off-island destinations during day-to-day operations. However, the fighter aircraft support equipment and cargo as well as household goods and personal vehicle shipments departing Guam, will require the program to scale up. DAF will be coordinating with the Joint Region Marianas biosecurity program to ensure sufficient funding is provided to support the increase in resources to extend the program for these parts of the Proposed Action.

The information in these documents, in addition to pre-consultation coordination site visits and meetings, email correspondence, field investigations, and other sources of information serve as the basis for this Biological Opinion. A complete administrative record of this consultation is on file at our office.

Consultation History

July 5, 2024: The U.S. Air Force requested initiation of formal consultation.

August 13, 2024: Project staff from the USFWS, Air Force, and NAVFAC Marianas discussed biosecurity and extirpated species aspects of the proposed action.

September 5, 2024: USFWS letter to the Air Force requesting effects of the action to sihek, åga, and ko'ko' be incorporated into the consultation.

September 27, 2024: USFWS received your letter regarding biosecurity (noted above) and Supplement to the Biological Assessment, addressing extirpated species.

December 4, 2024: The USFWS transmitted the DRAFT biological opinion to DAF.

December 16, 2024: The USFWS transmitted a second DRAFT biological opinion to DAF, incorporating the extirpated species.

January 10, 2025: DAF transmitted comments on the second DRAFT biological opinion to the USFWS.

January 23, 2025: The USFWS transmitted a third DRAFT biological opinion to DAF, addressing DAF comments.

February 6, 2025: DAF transmitted comments on the third DRAFT biological opinion to the USFWS.

February 19, 2025: DAF confirmed approval for DOD's requested timing for USFWS transmittal of this biological opinion.

BIOLOGICAL OPINION

Description of Proposed Action

The aircraft operations area at North Ramp, Andersen Air Force Base will be expanded, and an additional site will be developed within the munition storage areas (MSA-1). The 192-acre (ac) (78-hectare (ha)) airfield and 17-ac (7-ha) MSA-1 project footprints are shown in Figure 1. The proposed action will construct aircraft facilities to support the beddown, parking, storing, maintaining, refueling, loading, and unloading up to twelve F-15s and other US and partner nation aircraft and missions. The project will enable an approximately 32 percent increase in aircraft flights at Northwest Field. Aircraft beddown would be supported by stationing of approximately 205 new personnel and their families on Guam. Within the 209-acre construction footprint, the proposed action may include removal of vegetation from 151 acres (ac) 61 hectares (ha) of undeveloped land within the MSA-1 and North Ramp. The remaining 58 ac (23 ha) are previously developed. The project, as described in the BA is detailed below:

Summary of F-15 Beddown

The Proposed Action includes the beddown of up to 12 F-15 fighter aircraft at Andersen AFB, and would include airfield operations, supporting aircraft operations, and personnel to support the F-15 squadron's mission requirements. The aircraft beddown could include DAF F-15 fighter aircraft and/or F-15 fighter aircraft variants from partner nations. Key elements associated with the F-15 beddown include:

- Beddown up to 12 F-15 fighter aircraft with anticipated arrival in 2029
- Conduct F-15 aircraft operations (i.e., flight operations that include a takeoff and landing)
- Host periodic, temporary aircraft to support training missions for up to 12 F-15s
- Increase personnel at the installation to conform to squadron mission requirements

No aspect of the Proposed Action would alter the structure or overall nature or use of the local or remote airspace units, or the type, frequency, or location of munitions expenditures. All F-15 training flight operations and munitions expenditures would occur within the Mariana Islands Range Complex study area, as described in the *Final Environmental Impact Statement/Overseas Environmental Impact Statement for Mariana Islands Training and Testing* (DON 2015) and *Final Supplemental Environmental Impact Statement/Overseas Environmental Impact Statement for Mariana Islands Training and Testing* (DON 2020).

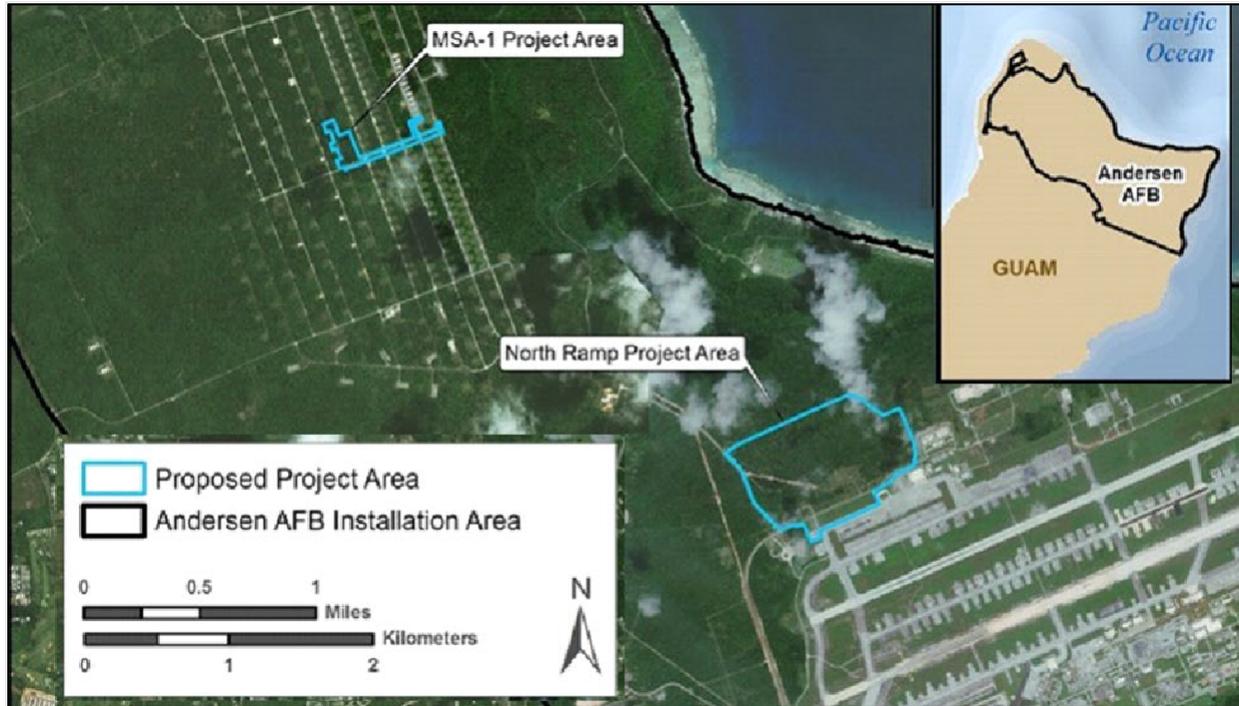


Figure 1. Project construction areas at North Ramp and MSA-1.

F-15 Airfield Flight Operations. F-15 aircrews would complete flight operations to maintain proficiency in the aircraft. The beddown of 12 F-15s at Andersen AFB would include an increase in total airfield operations, sorties, and closed patterns. As shown in Table 1, annual operations at the airfield would increase by approximately 32 percent. It is assumed that approximately 10 percent of total airfield operations and sorties would be conducted during the environmental night, from 10 p.m. until 7 a.m.

Periodic, Temporary Support Aircraft Airfield Operations. In accordance with the F-15 mission, Andersen AFB would support periodic, temporary training events with the based F15s, which would include hosting additional, non-permanent aircraft. Each training event would include an additional 12 F-15s (i.e., total of up to 24 F-15s per training event), 1 tanker/refueling aircraft (e.g., KC-135s, KC-46s, A-330s), and 1 early warning aircraft (e.g., G-550). It is anticipated that training events with these additional aircraft would begin during 2030, after the F-15 beddown action is complete, and would occur for 4 weeks per event, twice per year.

F-15 Support Personnel. Beddown of the F-15s would require basing sufficient personnel to operate and maintain the aircraft, and to provide necessary support services. Approximately

205 personnel would be required, which would include DAF and/or partner nation personnel (officer, enlisted, civilian) and contractor support, resulting in an installation personnel increase of approximately 4.4 percent. Personnel would also be accompanied by approximately 35 family members and dependents. Therefore, the total Andersen AFB personnel and dependent population would increase by approximately 3 percent. It is assumed that all personnel would reside in off-installation housing on Guam. Existing installation childcare, fitness, medical, and dining facilities and services would accommodate personnel, family members, and dependents associated with the proposed F-15 beddown.

Table 1. Current and Proposed Annual Airfield Operations.

Aircraft	Takeoffs ^a	Landings ^a	Closed Pattern Operations ^b	Total Operations ^c
Total Baseline Operations	7,475	7,475	4,390	19,340
Proposed Action Operations				
12 Based F-15s	1,800	1,800	1,320	4,920
12 Rotational Fighters (F-15s and F16s)	576	576	64	1,216
1 Rotational Tankers/Refueler	20	20	16	56
1 Rotational Early Warning Aircraft	12	12	8	32
Total Baseline and Proposed Action	9,883	9,883	5,798	25,564
Percent Change	32.2	32.2	32.1	32.2

Source: Andersen AFB 2021a, 2021b

^a Departures and arrivals based on flight plans submitted in 2021.

^b Each touch-and-go includes 2 closed pattern operations (1 landing and 1 takeoff). Total Touch-and-Go operations assumed to be the Total Airfield operations minus all arrivals and departures accounted for in submitted flight plans.

^c Total overall operations based on Andersen AFB (2021b) data and tower counts.

Summary of Infrastructure Upgrades. Infrastructure upgrades would occur adjacent to the existing airfield operations area and within the Munitions Storage Area (MSA), totaling approximately 209 ac (85 ha) (see Figure 1). Infrastructure upgrades adjacent to the existing airfield operations area would occur in a location referred to as the “North Ramp” construction footprint. The North Ramp footprint would require approximately 192 acres for construction. Infrastructure upgrades within the MSA, referred to as the “MSA-1” construction footprint, would require approximately 17 acres. Upgrades at the North Ramp would occur over approximately 3 to 7 years, beginning in 2025. Upgrades within MSA-1 would occur over approximately 2 years and coincide with North Ramp construction.

The DAF proposes to construct or install the following infrastructure at the North Ramp (Figure 2): Airfield pavements, aircraft hangar and maintenance facility, flightline maintenance facility and utility building, jet fuel receipt, storage, and distribution system extension, fencing and utilities extension, roadways and parking, and stormwater management infrastructure.

The DAF proposes to construct or install the following infrastructure within MSA-1: Three earth covered magazines (ECMs), pavements, including access road improvements, stormwater management infrastructure, in-ground utility lines to support the proposed ECMs, and temporary infrastructure to support construction.

Site Preparation Prior to construction, contractors would clear surface vegetation at the North Ramp and MSA-1 construction footprints. Due to the existing slope, grade, and topography of the North Ramp construction footprint, the DAF would clear surface vegetation from and grade the entire 192-acre construction footprint within the site layout boundary shown in **Figure 2**. Grading would create slopes of approximately 1.5 percent to no more than 10 percent across the entire North Ramp construction footprint. It is estimated that the grading could require approximately 35 ft (11 m) of fill in some locations. It is assumed that the majority of the fill material would be obtained from higher elevations within the North Ramp construction footprint and from fill suppliers on Guam. Best management practices (BMPs), detailed below, would be followed if any off-site fill material is required. It is not anticipated that the MSA-1 construction footprint would need substantial grading or fill material.

Site preparations would include activities in advance of clearing, such as topographic surveys, which involve minimal vegetation clearing. These activities would follow applicable BMPs discussed below. Site preparations for construction at the North Ramp would also include demolition of existing buildings, roads, and fencing. This would include demolition of Buildings 2550, 2551, and 2552; removal of an existing access road within the southwestern corner of the North Ramp construction footprint; and demolition of a portion of the existing Marianas Boulevard, which is east of the proposed gate within the southwestern corner of the North Ramp construction footprint.

New airfield fencing surrounding the North Ramp would be installed and connected to the existing perimeter fence. A portion of the existing perimeter fence would then be removed to allow for taxiway connection to the existing airfield apron. BMPs for soil erosion and sedimentation control will be used in accordance with project-specific drainage and erosion control plans. No vegetation clearing or grading would occur during nighttime.

Construction

North Ramp

Construction at the North Ramp would take place over approximately 3 to 7 years, beginning in 2025. Construction at the North Ramp would disturb a total of approximately 192 ac (78 ha) and would include the development of approximately 96 acres of facilities and infrastructure. Of this acreage, approximately 80 acres would be paved surfaces, 16 acres would be stormwater basins, and the remaining 96 acres would be revegetated and maintained (Table 2).

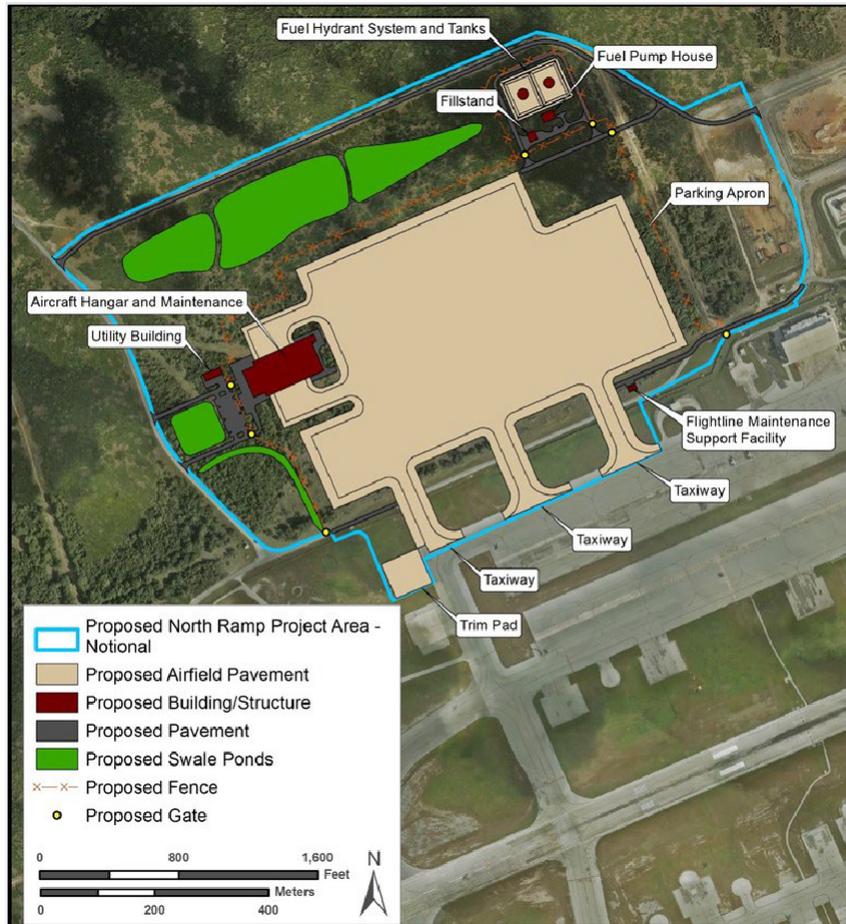


Figure 2. Proposed North Ramp infrastructure upgrades construction footprint.

Table 2. Facilities and Infrastructure Projects within the North Ramp Construction Footprint.

Project	Size ^a (Acres)
Airfield pavements (parking apron, taxiways, trim pad)	68
Aircraft hangar and maintenance facility	2
Flightline maintenance facility	0.05
Utility building	0.10
Jet fuel receipt, storage, and distribution system	4
Fencing and utilities extensions	N/A ^b
Roadways and parking	6
Stormwater management infrastructure	16
Total Acreage	96.15

N/A = not applicable

^a Size provided is the footprint (i.e., first floor) for the facility.

^b These extensions would be located within the proposed construction footprint or in areas that would be revegetated.

The North Ramp construction footprint includes all proposed infrastructure, construction laydown areas, a concrete batch plant location, and areas that would be revegetated and permanently maintained. The final location of infrastructure proposed within the construction footprint could change from the notional layout provided in Figure 2 based on engineering- or design-limiting factors as the planning process progresses and the site layout is finalized. Approximately 500 construction workers would be required to construct the infrastructure upgrades proposed at the North Ramp. Infrastructure would be constructed sequentially, meaning that personnel support would not increase and decrease, but would remain consistent across the construction period. It is assumed that construction workers would commute daily to the construction footprint in personal or construction vehicles, with two workers per vehicle. In addition to worker travel, construction activities would generate additional traffic to and from Andersen AFB, resulting from delivery of materials as well as other miscellaneous trips by inspectors, project managers, and other personnel visiting the site multiple times per day. It is estimated that a total of 270 construction-associated vehicles would enter and exit Andersen AFB each day during construction.

Construction activities would occur during both daytime and nighttime, with nighttime activities limited only to those that have unique safety or quality-control requirements. These nighttime activities would typically include removal of Munitions and Explosives of Concern or Unexploded Ordnance, which occurs when limited personnel are present nearby, as well as pouring, curing, cutting, and texturing of airfield concrete, which requires favorable weather conditions, minimization of impacts on base/airfield operations, and temporal specifications (i.e., cutting within 6 to 10 hours of pouring) for quality control.

Airfield Pavements. The DAF would construct a parking apron and taxiways to provide paved areas for aircraft parking, servicing, loading and unloading, and fueling. The taxiways would connect the parking apron to the existing taxi lanes, parallel to the existing runway. The parking apron and taxiways, which would be approximately 750 ft (229 m) from undisturbed limestone forest, would be constructed of concrete pavement with an overall depth of approximately 34 inches (in) (86 cm), which would include a drainage layer and separation layer atop a compacted subgrade or fill. The aircraft apron shoulder would be asphalt, with an overall depth of approximately 10 in (25.4 cm), including an aggregate base. Additionally, the existing trim pad adjacent to the proposed taxiways would be repaired with new concrete pavements and replacement of existing anchors.

Aircraft Hangar and Maintenance Facility. The proposed aircraft hangar and maintenance facility would provide a place to store aircraft during surge operations, inclement weather, contingency operations, and aircraft maintenance as well as provide space for administrative activities. Specifically, the proposed facility design includes three maintenance bays; a squadron operations facility; an aircraft maintenance unit; aircraft support shops (e.g., for wheels, tires, engines, batteries); a petroleum, oil, and lubricants storage area; an oil-water separator; warehouse space; office space; and an equipment shed.

Flightline Maintenance Support Facility and Utility Building. A flightline maintenance support facility would provide shelter and administrative space for operations personnel. The facility would also include storage space for tools and maintenance equipment. A utility building

would support the entire North Ramp development, and would house water pumps and water storage, electrical and communications systems, and a stand-by generator.

Jet Fuel Receipt, Storage, and Distribution System Extension. The proposed jet fuel receipt, storage, and distribution system at the North Ramp would be an extension of the existing Andersen AFB fuel system. The upgrades would include a hydrant fueling system and pits, a pumphouse, truck fill stands, fuel storage tanks, a tie-in to existing fuel transfer lines, and a new transfer line. The DAF proposes to integrate the North Ramp hydrant fueling system into the existing fueling system and include loop piping, hydrant pits, low-point drains and high-point vent pits, and an isolation pit. Two truck fuel stands would be located adjacent to the pump house and fuel tanks, with convenient access to the airfield refueling aprons and proposed access roads. The hydrant system would connect to the existing fuel transfer line at an existing pumphouse located within the southeastern corner of the construction footprint, via a new fuel transfer pipeline.

Fencing and Utilities Extension. Fencing would be installed around the parking apron and fuel system infrastructure and would include five gates within the construction footprint. Utilities would be installed either above or below ground, and would include electricity, communication, water, and sewer lines to assist in operation of the proposed infrastructure.

Roadways and Parking. To address traffic flow, the DAF would relocate the existing airfield perimeter roadway outside the proposed airfield perimeter fence and would modify the existing airfield perimeter road to provide access to the North Ramp. Additional roadways could be constructed within the construction footprint to provide access to individual facilities.

Stormwater Management Infrastructure. The DAF would construct stormwater infiltration swales and basins along the northern and western boundaries of the construction footprint to redirect and capture stormwater runoff from the parking apron and other paved surfaces.

MSA-1

Construction within MSA-1 would be expected to occur over approximately 2 years and would coincide with North Ramp construction. Construction of infrastructure upgrades within the MSA-1 construction footprint would disturb approximately 17 ac (7 ha) (Figure 3). Of this acreage, approximately 2 ac (1 ha) would be paved surfaces, 1.5 ac (1 ha) would be stormwater management infrastructure, 2.3 ac (1 ha) would be temporary disturbance to support construction, and the remaining 11.2 ac (4.5 ha) would be revegetated and maintained.

The MSA-1 construction footprint includes all proposed infrastructure, construction laydown areas, and areas that would be revegetated and permanently maintained. The final location of infrastructure proposed within the construction footprint could change from the notional layout provided in Figure 3 based on engineering- or design-limiting factors as the planning process progresses and the site layout is finalized.

The construction workforce supporting construction within the North Ramp construction footprint would be used for MSA-1 construction; therefore, no additional construction workers nor commuter traffic would be required for MSA-1.

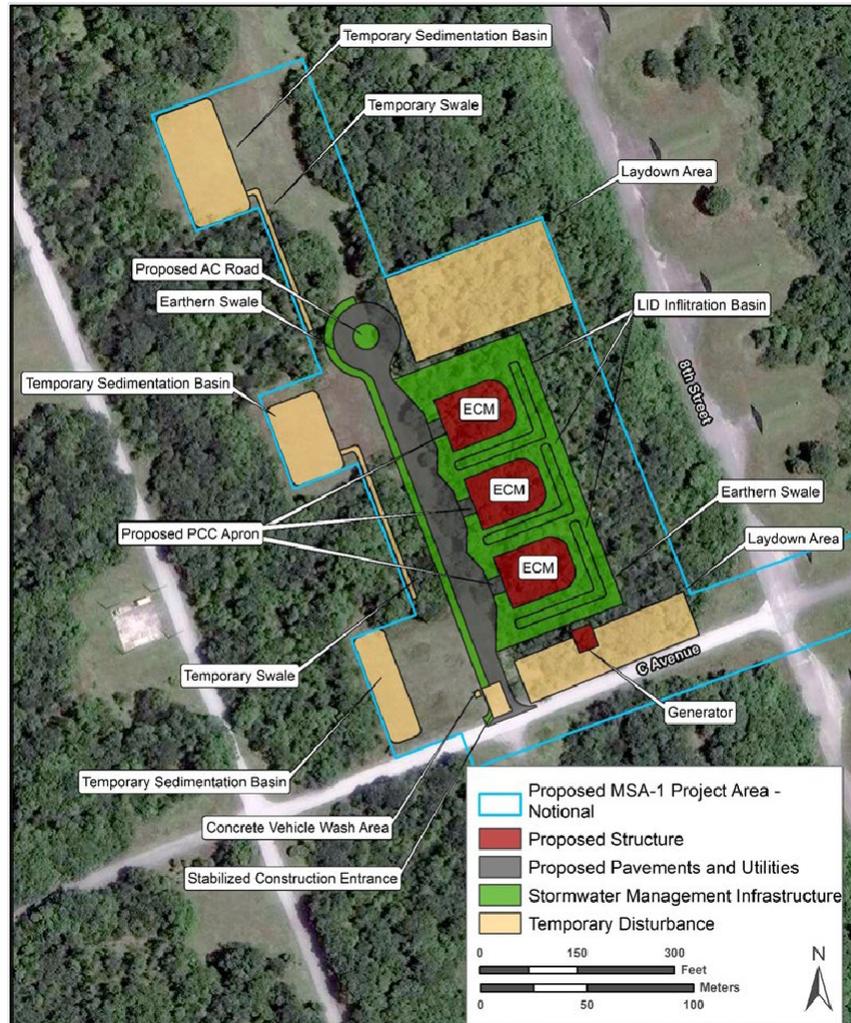


Figure 3. Proposed MSA-1 Infrastructure upgrades.

The DAF would construct three “Hayman style” ECMs within MSA-1. ECMs would be constructed as cast-in-place concrete or precast concrete structures that are rated to store munitions and would be covered with at least 2 ft (1 m) of earth fill (soil) that is anticipated to come from borrow areas within the installation boundary or the North Ramp construction site. Existing roadway pavements would be demolished for installation of electrical and communications lines to the proposed ECMs and connection to the existing utilities networks. When the electrical and communications lines are installed and connections are complete, new roadway pavements and maintenance holes would be installed. A paved access way with turnaround would be constructed perpendicular to the existing MSA-1 roadway, and Portland cement concrete aprons would be installed at the entrance to each ECM. Stormwater swales and infiltration basins would be constructed adjacent to the ECMs to capture stormwater runoff from each ECM.

Operations and Maintenance

North Ramp

Once installed, the fencing, utilities, roadways, parking, or stormwater basins would be maintained consistent to similar infrastructure currently on Andersen AFB. Active operations on the North Ramp would include aircraft idling, taxiing, and maintenance activities. Following construction, access to the North Ramp construction footprint from the west on Marianas Boulevard would be gate access only, and general base traffic on Marianas Boulevard would be routed northwest on 5th Street and around the North Ramp construction footprint, rather than through it. Additionally, the entire North Ramp construction footprint would be subject to regular vegetation maintenance.

MSA-1

Use of the proposed ECMs for munitions storage would not require changes to existing munitions protocols and would not require a change in the MSA-1 Explosive Safety Quantity Distance arcs. Munitions would be loaded, unloaded, and transported using the same routes, processes, and procedures currently used at Andersen AFB. Additionally, it is not anticipated that the infrastructure proposed within the MSA-1 construction footprint would be involved in “active” ground operations, require regular recurring maintenance (e.g., on a weekly basis), be staffed with personnel, or be operated differently than other similar infrastructure currently on Andersen AFB. The entire MSA-1 construction footprint would be subject to regular vegetation maintenance.

Impact Minimization, Avoidance, Mitigation, and Conservation Measures

Impact minimization, avoidance, and mitigation measures will be initiated prior to or during site preparation, construction, and operations to avoid or minimize the effects of the Proposed Action on ESA-listed species. This section identifies the BMPs dictated by federal, Department of Defense (DoD), DAF, or Guam regulations or guidance, or that will be implemented under the Proposed Action and that are applicable to protection of ESA-listed species.

This section also addresses proposed conservation measures for individual species that occur or may occur within the construction footprint. Proposed conservation measures have been developed to complement the ongoing natural resources management activities on Andersen AFB and northern Guam. JRM is responsible for the long-term management of natural resources on Andersen AFB. The timeframes associated with conservation measures in this BA are based on the period of DAF funding in direct support of the Proposed Action.

Following the conclusion of DAF funding for the Proposed Action, the long-term management of natural resources will be ensured by re-incorporating them into the JRM *Integrated Natural Resources Management Plan* (INRMP) (DON 2022).

Best Management Practices

Site Preparation and Construction

- During site preparation and prior to any clearing of surface vegetation, the construction perimeter will be clearly marked to prevent encroachment into adjacent areas.

- A *Hazard Analysis Critical Control Point (HACCP) Plan* will be developed to ensure that invasive species are not moved or introduced in association with site preparation, construction, or salvage and transplantation activities. The JRM Biosecurity Program Manager will review each plan, and the DAF must approve each plan prior to commencement of activities.
- For off-site fill material, contractors will be required to obtain aggregate/soil from contractors/vendors who have local permits. Imported sand and other quarried products from abroad are subject to inspection by the Guam Department of Agriculture, which issues an importation permit. All sand and aggregate material imported must be accompanied by official records indicating chemical composition, pest-free certification, treatment certification, and certificate of origin. Treatment (disinfection) must be conducted at the point of origin.
- Contracts for site preparation, construction, and salvage, and transplant will incorporate approved methods for processing of green waste and mulch piles to prevent the spread of little fire ant, coconut rhinoceros beetle, and other invasive species, and to control their spread if present. A biological monitor will inspect the work sites to confirm that vegetation debris is properly managed in accordance with green waste protocols.
- Little fire ant surveys will occur throughout construction to ensure that construction activities do not introduce the little fire ant to the area. Management of invasive species at Andersen AFB are ongoing under the JRM INRMP; if the little fire ant is discovered, proven control and eradication actions will be implemented and followed by post-eradication monitoring (Puliafico et al. 2022).
- Silt fences, straw wattles, or another DAF-approved BMP method will be used to prevent soil erosion into adjacent areas. Dust screens will be used to shield ESA-listed plants that are within 10 ft (3 m) of the construction clearing line. When a major storm or high-wind event (greater than 39 miles/hour) is anticipated, remove silt fences and dust screens to prevent damage to ESA-listed species.
- Site preparation will not occur during nighttime as part of this project, and all site preparation will end 30 minutes before sunset. Nighttime construction will be required for specific activities, including, but not limited to, removal of Munitions and Explosives of Concern and Unexploded Ordnance as well as pouring and cutting of concrete.
- The extent and frequency of working during nighttime will be minimized by ensuring shifts begin on time, saw cutting is initiated as soon as the concrete is ready, and night shift work is not made routine.
- Lighting associated with nighttime work will be hooded, pointed downwards, and directed to not shine toward the known roosting location to minimize potential effects to fanihi roosting activities.
- Andersen AFB staff will inspect the contractor's work to ensure that BMPs are implemented for the entire project duration. Andersen AFB staff will conduct random inspections monthly and document the results in a log.

Operations and Maintenance

- New outdoor artificial lighting will be hooded and designed to provide the lighting levels required in the Unified Facilities Criteria while minimizing potential effects to fanihi foraging or roosting activities.

- Infrastructure and utilities will be designed with appropriate spill prevention and response procedures to avoid introduction of hazardous chemicals that could affect ESA-listed species.
- Aircraft and cargo departing Andersen AFB for other locations will be subject to brown treesnake detector dog inspections as per Joint Regions Marianas Instruction 5090.10A.
- Invasive species management actions outlined in the JRM INRMP (and all subsequent updates) will continue to be implemented during operations to prevent the spread of invasive species (DON 2022). Incoming materials and aircraft will be inspected as part of the Joint Region Marianas biosecurity program and will be subject to the Brown Treesnake and Biosecurity Management Strategy for Training Activities within Guam & Commonwealth of the Northern Mariana Islands. DAF will be coordinating with the Joint Region Marianas biosecurity program to ensure sufficient funding is provided to support the increase in resources to extend the program for the Proposed Action.

Conservation Measures

The conservation measures included below provide an overview of the actions that the DAF will take to mitigate adverse effects to ESA-listed species considered in this BA. The goal of these conservation measures is to promote these species' continued existence by contributing to no net loss and minimizing indirect effects. The proposed conservation measures were also developed using the best available science in accordance with 50 CFR 402.14 (d).

After the conservation measures have been fully implemented, the long-term management of the species addressed in this consultation will be re-incorporated into the JRM INRMP. Information collected during implementation of these conservation measures will be used to inform long-term management actions in accordance with the JRM INRMP.

All Species

General: For protection of federally listed species within the action area, the DAF will ensure that the Proposed Action will be implemented as described. A contractor education program will be administered to ensure contractor personnel working at the project site are informed of the biological resources within the construction footprint, including ESA-listed species, invasive species, special status species, avoidance measures, and reporting requirements.

ESA-listed Plant Salvage Preparation: Prior to vegetation clearing, a qualified biologist will perform a field assessment of the construction footprints and a 10-foot (3-meter) buffer to map the locations of all threatened and endangered species, including home/host plant locations. The assessment will determine the current number of individuals and health status assessment of *Cycas micronesica*, *Tabernaemontana rotensis*, *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense* that cannot be avoided within the construction footprint. The health assessment will be performed by a qualified biologist to determine how many individuals can be salvaged through seed collection, plant part salvage, and/or whole plant salvage.

A qualified biologist is defined as a person who:

- Has successfully completed a full 4-year course of study at an accredited college or university leading to a bachelor's or higher degree, which includes a major field (24 semester hours) of study in biological sciences, wildlife biology, botany, natural resources management, environmental sciences, or related disciplines appropriate to this position;
- Has a minimum of 20 documented hours of field identification (positive results) of the threatened and endangered species or closely related species; and
- Provides three references to validate experience.

OR

- Has a minimum of 24 semester hours (or equivalent quarter hours) in biological sciences, wildlife biology, botany, natural resources management, environmental sciences, or related disciplines appropriate to this position at an accredited college or university;
- Has 1 year (2,000 hours) of field biology survey experience in the Pacific Islands;
- Has a minimum of 20 documented hours of field identification (positive results) of the threatened and endangered or closely related species; and
- Provides three references to validate experience.

Establishment of a Forest Enhancement Area at Tarague: A 151-ac (61-ha) area on Andersen AFB will be designated as a forest enhancement area (Figure 4). The final size and shape of the forest enhancement area might differ from that shown in Figure 4 to avoid steep topography and other obstacles for fencing. The proposed forest enhancement area is within the Guam Micronesian kingfisher Memorandum of Agreement lands and adjacent to existing fenced conservation areas.

The 151 ac (61 ha) of habitat in Tarague that will be enhanced is approximately 92 ac (37 ha) of coconut forest, 56 ac (23 ha) of limestone forest, and 3 ac (1 ha) of shrub/grassland. The coconut forests are remnants of several copra plantations (Liston 1996). Recent vegetation surveys within the forest enhancement area noted that this part of the Tarague basin has low diversity but a high percentage of native trees, with only three species, *Meiogyne cylindrocarpa*, *Cocos nucifera* and *Ochrosia oppositifolia*, comprising more than 75 percent of the recorded tree species within the survey area (Vogt and Salas 2024). Planting of native plant species as well as removal of invasive plant species and ungulates will provide a sustainable resource for ESA-listed species by supporting recovery of native forest habitat and increasing resiliency against invasive plant species establishment within the forest enhancement area.

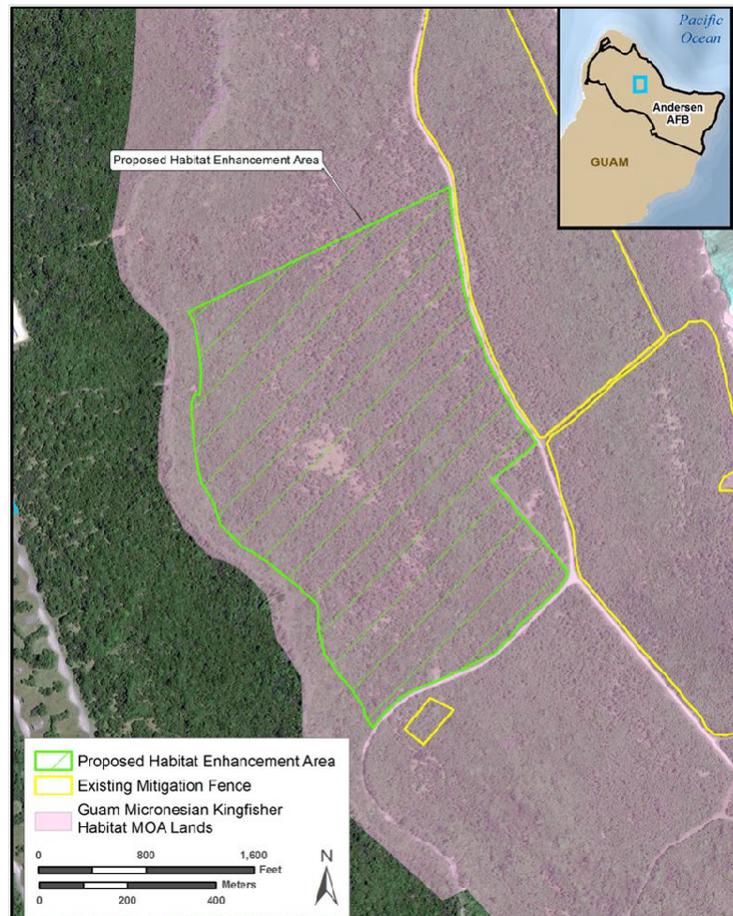


Figure 4. Proposed forest enhancement area at Tarague.

The 151-ac (61-ha) forest enhancement area will be surveyed to record existing ESA-listed species (including a health assessment), native and non-native canopy trees, and invasive species that require removal or treatment. A separate work plan will be prepared for forest enhancement that describes the forest enhancement area preparation, native seed collection, and forest enhancement (transplanting) methods. The activities associated with forest enhancement (transplanting), such as removal of vegetation for installation of foot paths, water lines, or invasive species removal, will adhere to recommended buffer distances (typically 3 ft [1 m]) to avoid adverse impacts to in-situ ESA-listed species. A copy of the final forest enhancement work plan will be provided to the USFWS for situational awareness.

Within the 151-ac (61-ha) forest enhancement area, invasive species will be removed or treated with pesticide/herbicide to improve the native forest and allow for additional native plants to be transplanted into the area. Invasive canopy trees (i.e., *Vitex parviflora*) will be removed to support establishment of native canopy tree species. All pesticide treatments will be performed by a Guam Environmental Protection Agency-certified pesticide applicator and follow label specifications and Andersen AFB Integrated Pest Management Plan reporting requirements.

A permanent ungulate-proof fence will be installed around the 151-ac (61-ha) forest enhancement area. Construction of ungulate-proof fencing will occur prior to, or concurrent

with, the vegetation removal at the construction footprint. Installation of fencing will include surveys and monitoring to ensure fence alignment will not affect ESA-listed species. Removal of vegetation for installation of fencing will adhere to recommended buffer distances (typically 3 ft (1 m)) to avoid adverse impacts to in-situ ESA-listed species. Fencing will meet the JRM ungulate fencing standards, and vegetation maintenance will be implemented as needed to ensure integrity of the fence. Within 72 hours after a major storm or high-wind event (wind speeds equal to or greater than 39 miles per hour or 34 knots), ungulate fencing will also be inspected for breaches, and fencing will be repaired or replaced immediately after detection.

After the ungulate-proof fencing is installed, ungulates (pigs and deer) will be eradicated within the fence limits. Multiple techniques will be used to eradicate ungulates, including trapping and active shooting using a professional ungulate control company or agency. Ungulate eradication is anticipated to take 18 months.

Seed Collection, Salvage, and Transplant for Habitat Enhancement: To support native forest enhancement, seeds from native trees within the construction footprints will be collected, germinated, propagated, and transplanted within the forest enhancement area. To increase the diversity of native trees, especially for fanihi forage, target species for seed collection may include, but are not limited to, *Ficus* spp., *Elaeocarpus joga*, *Intsia bijuga*, and *Artocarpus mariannensis*. Other native forest enhancement projects in Tarague are in the early planning stages (Vogt and Demeulenaere 2024), but within the 151-ac (61-ha) forest enhancement area, approximately 5 seedlings per acre (or approximately 755 seedlings), will be planted. A forest enhancement work plan that describes the salvage, propagation, and transplant methods for native tree species will be prepared. Recommended species, number of transplanted individuals, and planting configurations will be included in the forest enhancement work plan that is developed following field assessment of the forest enhancement area. The final number of seedlings planted will be consistent with other forest enhancement areas in Tarague and will be included in the final forest enhancement work plan. Forest enhancement activities described in the work plan and implemented under this project will be subject to listed plant buffer distances and other standard measures to avoid adversely impacting them. A copy of the final forest enhancement work plan will be provided to USFWS for situational awareness.

To prevent environmental stressors on the ESA-listed plants, plant assessments and collection of material will be conducted before any site preparation. Once all the plant material is collected, the site preparation will be approved to commence. Using methods described in the plant salvage and transplant work plan, ESA-listed species *Cycas micronesica*, *Tabernaemontana rotensis*, *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense* will be salvaged from the construction footprint. Collected seeds, cuttings, or whole plants may be housed in a nursery for propagation until deemed suitable for transplanting. Propagated plants will be maintained in a nursery that follows the Hawaii Rare Plant Restoration Group's (HRPRG's) *Phytosanitation Standards and Guidelines* (HRPRG 2010). Propagation may include supplemental watering, mechanical weed or pest removal, pruning, treatment with fertilizer or pesticide, and other adaptive management techniques to maximize survivorship and plant health.

Cycas micronesica and *Tabernaemontana rotensis* will be transplanted into the 151-ac (61-ha) forest enhancement area when suitable for transplanting. Orchids will be transplanted into the

HMU. Plants will be maintained and monitored until they are considered established. *Cycas micronesica* will be considered established when they do not require supplemental watering, fertilizer, or support structures, and show stem growth of at least 0.4 inches (1.0 centimeter) as measured below the base of the existing leaves (fronds). *Tabernaemontana rotensis* will be considered established when they are between 2 and 3 ft (0.6 and 0.9 m) tall; leaves remain turgid on the plant; individuals produce apical stem growth; and individuals no longer require supplemental watering, fertilizer, or support structures. *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense* will be considered established following documented observation of new root growth after transplant and root attachment to the host tree.

After transplanting, maintenance of ESA-listed species may include watering, fertilizing, pesticide treatment, use of support structures, or invasive species removal. Invasive species will be removed within a 20-ft (6-m) radius around transplanted vegetation. The maximum percent cover of invasive understory, overstory, and vine plants permitted within the forest enhancement area and details of removal will be determined following the field assessment.

Maintenance will be reduced and eliminated during a hardening-off period, then the plants will be monitored for at least 6 months following cessation of maintenance activities. Maintenance will occur only during daylight hours. Once plants have become established, intermittent monitoring will occur throughout the 20-year project period and confirmation of live listed plant numbers will occur at Project Years 5, 10, 15, and 20.

The ESA-listed plant species that are not salvaged within 10 ft (3 m) of the construction perimeter will be monitored once every 6 months during site preparation and construction activities. The USFWS will be contacted if adverse effects to the monitored plants that are clearly attributed to construction activities (e.g., physical disturbance, dust accumulation, and sedimentation from run-off) are detected. Monitoring will conclude at construction completion.

Cycas micronesica

In addition to the conservation measures described in the preceding sections for all ESA-listed species, the following will be implemented specifically for *Cycas micronesica*. Within the portions of the action area that will be cleared of vegetation, seed collection will be initiated from *Cycas micronesica*. An individual designated as a qualified biologist will conduct monthly monitoring of the construction footprints to determine if *Cycas micronesica* are producing seed and if the seed has matured for collection. As *Cycas micronesica* produces an orthodox seed that can be stored and remain viable in climate-controlled conditions, seeds will be collected and stored in accordance with a seed collection work plan and will be germinated to meet replacement goals. If there is no seed production or pup production within the construction footprint prior to vegetation clearing, then seeds or pups may be collected from other locations on Andersen AFB in order to meet replacement goals.

For *Cycas micronesica*, the health assessment will use the Cycad Assessment Criteria Worksheet (Table 3) to determine which individuals meet the criteria for salvage and which are not salvageable. All plants assessed during the field assessment as meeting the criteria of “salvageable” in accordance with the Cycad Assessment Criteria Worksheet during the field assessment will be salvaged as apical stems and/or vegetative propagules (pups). The survival criteria for *C. micronesica* will be based on the Cycad Conservation Framework (Table 3), which will use the number assessed as salvageable during the field assessment in accordance with the

Cycad Assessment Criteria Worksheet in the BA. As of 2024 surveys, 222 individual *C. micronesica* are located within the project footprints. The number of remaining live *C. micronesica* in the project footprints is expected to decline to between 180 and 209 in project Year 1. As shown in the example in Table 3, using 209 live *C. micronesica* in Year 1 as an example, an estimated 146 (70 percent) of these 209 live plants is expected to be salvageable.

This XX-number (146 in this example, number of salvageable plants) will be updated based on actual number of salvageable *C. micronesica* found remaining in the project footprints in project Year 1. This XX-number will serve as the basis for the years 5, 10, 15, and 20 (highlighted in the example in grey) numbers of live project-transplanted *C. micronesica* at the Tarague forest enhancement area. Monitoring will be conducted in the intervening years to inform decisions about management conducted at the site to boost survival of transplanted *C. micronesica*, or to collect additional propagules to transplant additional plants to ensure 5-year targets are met.

All salvageable *Cycas micronesica* within the construction footprint will be treated to an annual treatment with a slow-release pesticide with active ingredients that may include imidacloprid, dinotefuran, clothianidin, acephate, or biocontrol to treat Asian cycad scale prior to salvage. Additionally, existing *C. micronesica* within the forest enhancement area will be subject to an annual treatment with a slow-release pesticide with active ingredients that may include imidacloprid, dinotefuran, clothianidin, acephate, or biocontrol to treat Asian cycad scale for a duration of 20 years. Insecticide will not be applied to *Cycas micronesica* that are flowering to avoid impacts to pollinators.

Transplanted *Cycas micronesica* will be planted in a suitable microclimate and will be more than 40 ft (12 m) from *Vitex parviflora* trees if *Vitex parviflora* removal has not occurred at the time of transplant. To the maximum extent possible, propagated plants from the same genetically unique individual (i.e., a stem and pup from the same parent tree) will be planted the maximum distance apart allowed by the planting arrangement.

Table 3. Example “XX” Number of Salvageable *Cycas micronesica* in Project Footprints in Year 1, and the Subsequent Year 5, 10, 15, and 20 Number of Live Transplanted *C. micronesica* at Forest Enhancement Area.

YEAR		5.8% Future Decline: Baseline - Actual (surveyed) and projected future number of Cycads expected to persist in the proposed development area in the absence of the proposed action, based on the 5.8% annual decline rate at the optimistic low end of our confidence interval		Project Conservation Outplanting: Minimum number of outplanted <i>Cycas micronesica</i> at the forest enhancement area, Tarague, in Years 5, 10, 15, and 20, will be based on XX (the number of "salvageable" <i>C. micronesica</i> in the project footprints in project year 1. Estimating there will still be 209 live <i>C. micronesica</i> in project Year 1, and estimating 74.6% of those will be found to be "salvageable", the placeholder XX in this example is 155. The subsequent years numbers reflect a 5.8% annual decline. Years 5, 10, 15, and 20 are highlighted to reflect the project's conservation commitment to ensure this number of propagated/outplanted <i>C. micronesica</i> are alive in the Tarague forest enhancement area in those years (tracking a 5.8% annual rate of decline in "salvageable" plants in the project footprint)
2021 Site Surveys	2021		416	
	2022			(Note, between 2021 and 2024 surveys, project footprint <i>Cycas</i> numbers dropped 47%, an annual average rate of 18.9%)
	2023			
2024 Site Surveys	2024		222	
Year 1 Land Clearing	2025	1	209	<i>XX Expected to be Estimated 146</i>
	2026	2	197	138
	2027	3	186	130
	2028	4	175	122
Year 5	2029	5	165	115
	2030	6	155	109
	2031	7	146	102
	2032	8	138	96
	2033	9	130	91
Year 10	2034	10	122	86
	2035	11	115	81
	2036	12	108	76
	2037	13	102	72
	2038	14	96	67
Year 15	2039	15	91	63
	2040	16	85	60
	2041	17	80	56
	2042	18	76	53
	2042	18	71	50
Year 20	2043	20	67	47

Tabernaemontana rotensis

In addition to the conservation measures described in the preceding sections for all ESA-listed species, the following will be implemented specifically for *Tabernaemontana rotensis*. A health assessment will be performed by a qualified biologist to determine how many individuals can be salvaged through seed collection and plant part salvage. Previous surveys identified 99 *T. rotensis* trees within the project footprints that may be subject to impacts from removal during vegetation clearing. Of those 99 trees, approximately 74 were recorded as being mature enough to potentially produce seed for collection. The number of *T. rotensis* needed to meet the survival criteria will be based on the number assessed as salvageable during the field assessment.

A qualified biologist will collect cuttings and ripe fruits available for seed germination from mature individual *Tabernaemontana rotensis* trees within the North Ramp construction footprint. *Tabernaemontana rotensis* seeds will be collected to ensure the survival of a minimum of 100 percent of the mature individuals at the time of health assessment. If the trees within the construction footprint do not produce seeds prior to being removed, then propagation of cuttings from trees within the construction footprint or seeds collected from the forest enhancement area may be used as a contingency. Propagules from mature individual *T. rotensis* trees within the North Ramp construction footprint are not required to be genetically unique.

For *Tabernaemontana rotensis*, the health and maturity assessment will determine how many genetically unique individuals can potentially be salvaged through seed collection or cuttings.

For *Tabernaemontana rotensis*, the survival criteria will ensure the survival of a minimum of 100 percent of the transplants to offset the impacts to the mature individuals at the time of health assessment. Based on the occurrence of 74 mature *T. rotensis*, an estimated 74 plants will be propagated and outplanted. Conservation management or additional outplanting will be conducted to ensure there remain 74 *T. rotensis* outplants alive in project years 5, 10, 15, and 20 (Table 4).

Table 4. *Tabernaemontana rotensis* Estimated Conservation Framework

Project Year	Year	Estimated Number That Would Have Remained In Project Footprint (Will be updated based on numbers found in Year 1)	Number of Propagated / Outplanted Plants in Conservation Site
1	2026	74	
2	2027	74	
3	2028	74	
4	2029	74	
5	2030	74	74
6	2031	74	
7	2032	74	
8	2033	74	
9	2034	74	
10	2035	74	74
11	2036	74	
12	2037	74	
13	2038	74	
14	2039	74	
15	2040	74	74
16	2041	74	
17	2042	74	
18	2043	74	
19	2044	74	
20	2045	74	74

Orchids: *Bulbophyllum guamense*, *Dendrobium guamense*, *Tuberolabium guamense*

In addition to the conservation measures described in the preceding sections for all ESA-listed species, the following will be implemented specifically for orchids. A health assessment will be performed by a qualified biologist to determine how many individuals can be salvaged through whole plant salvage. Previous surveys identified 100 *Tuberolabium guamense*, one *Bulbophyllum guamense*, and two *Dendrobium guamense* within the project footprints that may be subject to impacts from removal during site preparation. Of those, approximately 73 *T. guamense*, one *B. guamense*, and two *D. guamense* were recorded as being large and healthy enough to be potentially salvageable. The number of *T. guamense*, *B. guamense*, and *D. guamense* needed to meet the survival criteria will be based on the number assessed as salvageable during the field assessment. A qualified biologist will salvage individual *Tuberolabium guamense*, *Bulbophyllum guamense*, and *Dendrobium guamense* within the North Ramp construction footprint. The salvageable healthy orchids will be collected and transplanted to a conservation area and, when necessary to ensure the number of healthy salvageable orchids in the wild remains unchanged as a result of the action, seeds may be collected from other locations on Andersen AFB and propagated and maintained in a nursery until deemed suitable for transplanting to meet replacement goals.

For *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense*, the health assessment will determine the number of genetically unique individuals that can potentially be salvaged and directly transplanted to new host trees. The survival criteria will ensure the survival

of a minimum of 100 percent of the mature individuals at the time of the health assessment, consistent with other recent consultations (Andersen AFB 2020).

Following completion of the field assessment, a work plan will be prepared to describe the seed collection, propagation, and transplant methods to be used. A copy of the final plant salvage and transplant work plan will be provided to USFWS for situational awareness.

Orchids will be transplanted into an approximately 1-acre area within the HMU. Specific transplant site selection will be based on which location within the HMU has the best conditions suitable for the orchids. Orchids will be transplanted onto native host trees in a micro-climate consistent with their salvage location. No more than seven orchids will be affixed to an individual host tree. Individual orchids and host trees will be tagged using alphanumeric tags. The existing HMU is known to have existing ESA-listed orchids and suitable native host trees. The final location of orchid transplant within the HMU will be determined by a qualified biologist.

Fanihi

In addition to the conservation measures described in the preceding sections for all ESA-listed species, the following will be implemented specifically for fanihi.

Training and Monitoring: Awareness training to prevent disturbance to fanihi during site preparation and construction will be delivered to the contractor during an in-person meeting.

During nighttime work, contractor personnel will be responsible for performing biological monitoring on site while nighttime work is underway to observe for fanihi. A variety of methods will be used, including infrared cameras if conditions allow for a bat's heat signature to be distinguished from background vegetation (i.e., if the vegetation is cool enough). If a bat is observed within 492 ft (150 m) of the project site prior to activities being conducted, activities within 492 ft (150 m) of the bat will be postponed until the bat has left of its own volition. One or more biological monitor(s) will have no other duties at the work site.

Invasive Species Management: Brown treesnake traps will be deployed on the perimeter fencing of the North Ramp and will be monitored and maintained for 20 years following installation of those fences.

Little fire ant surveys will be performed at established entry points into the 151-ac (61-ha) forest enhancement area. Surveys will be conducted beginning at the time of the forest enhancement area surveys and will conclude 5 years following transplant of salvaged plants, at which time regular entry into the forest enhancement area is not expected to occur. If little fire ant is discovered during the surveys, proven control and eradication actions will be implemented and followed by post-eradication monitoring (Puliafico et al. 2022). Following the 5 years of surveys, long-term management of this invasive species will be addressed by the commitment in the JRM INRMP to annually survey high-risk areas for little fire ant using established protocols.

Action Area

The action area is defined at 50 CFR 402.02 as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action.” The USFWS has determined that the action area in relation to impacts of aircraft sound for the proposed action is the northern half of Guam, exclusive of lands below the cliff north of the DoD installation at Ritidian Point. North Guam is likely to be exposed sound levels including low-frequency sound and audible sound, from the flight operations of project aircraft would exceed 60 decibels. Terrain is expected to shield the oceanfront toe of the slope at Ritidian from high levels of project-related sound. The action area for the listed plants is limited to within 33 ft (10 m) of the construction footprints at North Ramp and MSA-1, additional areas on Andersen AFB where *Cycas micronesica* and orchid propagules may be collected for conservation propagation and outplanting, and it includes the forest enhancement area at Tarague, HMU, and golf course conservation sites, where conservation actions are proposed.

Analytical Framework for the Jeopardy Analysis

In accordance with regulation (see 84 FR 44976), the jeopardy determination in this Biological Opinion relies on the following four components:

1. The *Status of the Species*, which evaluates the species’ current range-wide condition relative to its reproduction, numbers, and distribution; the factors responsible for that condition; its survival and recovery needs; and explains if the species’ current range-wide population is likely to persist while retaining the potential for recovery or is not viable;
2. The *Environmental Baseline*, which evaluates the current condition of the species in the action area relative to its reproduction, numbers, and distribution absent the consequences of the proposed action; the factors responsible for that condition; and the relationship of the action area to the survival and recovery of the species;
3. The *Effects of the Action*, which evaluates all future consequences to the species that are reasonably certain to be caused by the proposed action, including the consequences of other activities that are caused by the proposed action, and how those impacts are likely to influence the survival and recovery role of the action area for the species; and
4. *Cumulative Effects*, which evaluates the consequences of future, non-Federal activities reasonably certain to occur in the action area on the species, and how those impacts are likely to influence the survival and recovery role of the action area for the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the consequences of the proposed Federal action in the context of the species’ current range-wide status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild. The key to making this finding is clearly establishing the role of the action area in the conservation of the species as a whole, and how the effects of the proposed action, taken together with cumulative effects, are likely to alter that role and the continued existence (i.e., survival) of the species.

Status of the Species

General Threats to the Listed Species

The listed species are vulnerable to habitat loss and disease and predation. Habitat loss and degradation due to development, invasive animals, invasive plants, wildfire, and typhoons are ongoing. Habitat clearing for development is among the greatest threats to the recovery of the species. The archipelago's native habitats have been lost and degraded by residential, urban, and military development, ranching, clearing for agriculture, military training activities, and bombing and ground combat during World War II (Ohba 1994, pp. 17, 28, 54–69; Mueller-Dombois and Fosberg 1998, p. 242; Berger et al. 2005, pp. 45, 105, 110, 218, 347, 350). More than 20% of Saipan and Guam and approximately 6% of Tinian and Rota are developed (Spies et al. 2019, p. 7). The total loss of native forest on Guam and Rota since human settlement is estimated to be 83 and 53 percent, respectively (Willsey et al. 2019, pp. 13-18).

Invasive animals including ungulates, the brown treesnake (*Boiga irregularis*), rodents (Hawaii DLNR 2020, p. 1), and invasive ants degrade native forest habitat for the listed species. Many native plants and animals from the Mariana Islands, as well as other Pacific islands, lack competitive and predator avoidance mechanisms because they evolved in the absence of invasive plants and animals (Fritts and Rodda 1998 p. 115). With few exceptions, invasive species are non-native and have been introduced to the Mariana Islands by humans.

Ruminant ungulates including Philippine deer (*Rusa marianna*), goats (*Capra aegagrus hircus*), pigs (*Sus scrofa*), cattle (*Bos spp.*), and water buffalo (*Bubalus bubalis*) degrade habitat on Pacific Islands by preventing regeneration of native plants via browsing, grazing, and trampling (Stone et al. 1992, p. 666-702; Leopold and Hess 2017, entire; Latham et al. 2017, entire; Gawel et al. 2018, entire; Manglona pers. comm. 2019, 2021). Mortality of palatable native plants increases availability of habitat for colonization by invasive plants and can lead to barren land and extensive soil erosion (Diong 1982; Stone et al. 1992; Tep and Gaines 2003, and Liddle et al. 2006, in JRM 2019 in litt., p. 4-30). In the Mariana Islands, browse lines are visible where palatable native tree and understory vegetation is removed as high as these invasive animals can reach (Bruns 2019, pers. comm; Rieffanaugh 2021, pers. comm.). In Guam, centuries of deer browsing preferences have shaped species composition of forests (Gawel et al. 2018, p. 9). Ungulates also facilitate the spread of invasive plants by transporting seeds and plant parts (Cuddihy and Stone 1990, pp. 63–64) although on Guam, pigs may be aiding in the dispersal of native seeds where native seed dispersers have been extirpated by the brown treesnake (Gawel et al. 2018, pp. 5-10). As of 2023, 2,286 ac (925 ha) of native forest in Guam are fenced to exclude ungulates and ungulates have been removed from approximately 65 percent of these areas (Burt pers. comm. 2023; Kedziora pers comm. 2023; Loerzel pers comm. 2023; Mizerek pers. comm., 2023). Ungulate removal is being implemented pursuant to the 2017 [USFWS] U.S. Fish and Wildlife Service. 2017, Reinitiation of the 2015 Biological Opinion for the Department of the Navy's Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam (USFWS 2017, p. 40) within the 600-ac (243-ha) ungulate-fenced area of the Mason Live-Fire Training Range Complex (Loerzel pers. comm. 2023).

The invasive brown treesnake threatens the persistence of native habitats indirectly via the elimination of vertebrate seed dispersers and pollinators. Introduced to Guam in approximately 1949, it caused the extinction of a majority of Guam's endemic birds. The brown treesnake poses an ongoing threat to the persistence of the habitats needed for the recovery of the species (Rodda et al. 1997, p. 565-567; Fritts and Rodda 1998, pp. 115, 131; Savidge 1987, entire; Perry and Morton 1999, p. 137; Rodda and Savidge 2007, p. 311; Wandrag et al. 2015, p. 4-6). Almost three quarters of Guam's native trees depend on birds to eat their fruits and disperse their seeds (Rogers et al. 2009, in litt.). Seeds falling under parent trees experience reduced germination and survival due to conspecific competition and increased exposure to pathogens and herbivores (Rogers et al. 2017, p. 3; Nathan and Muller-Landau 2000, p. 278-283; Muller-Landau 2001, p. 165-178). In addition, germination of some seeds is reduced unless seed coats are digested by passing through the gut of a bird (Rogers et al. 2009, in litt.). On Guam, the only remaining native avian frugivore is the Micronesian starling (*Aplonis opaca*); 86% of species in the seedbank on Guam had a conspecific adult plant nearby compared to 33% on Rota and 39% on Saipan, which still supports a relatively intact avian frugivore community (Wandrag et al 2015, p. 6). In the absence of avian seed dispersers in Guam, 94% of *Psychotria* seeds and 95% of *Premna* seeds fall beneath the parent's canopy compared with 26% and 40% on islands with avian seed dispersers (Rogers et al 2017, p. 3). On Saipan, the median distance of the seeds of 15 tree species dispersed by 5 bird species was 184 ft (56 m) (Rehm et al. 2019, pp. 1, 5). In Guam, the extirpation/extinction of native seed dispersers due to the brown treesnake is reducing recruitment and forest regeneration, the spatial distribution of native tree species and species richness (Rogers et al. 2017, entire). The potential introduction of the brown treesnake to other islands poses an ongoing threat to all native habitats.

Rats have caused plant and animal extinctions across Pacific islands directly through predation and indirectly by altering native habitats by reducing native plant reproduction and vigor by eating fruits, seeds, flowers, stems, leaves, roots, and other plant parts (Cuddihy and Stone 1990, p. 69; Campbell and Atkinson 1999, in Atkinson and Atkinson 2000, pp. 23-24; Shiels et al. 2014, pp., 152-159; Shiels and Drake 2015, p. 1; Duron et al. 2017, p. 764). Three rat species are found throughout the Mariana Islands: the Polynesian (*Rattus exulans*), the Norway (*R. norvegicus*), and a newly introduced southeast Asian *Rattus* species, originally thought to be *R. diardii* (synonymous with *R. tanezumi*) (Kuroda 1938 in Wiewel et al. 2009, p. 208; Wiewel et al. 2009, pp. 210, 214-216). One or more of these species are present on all 15 islands of the Mariana archipelago (Wiewel et al. 2009, pp. 205-222; Kessler 2011, p. 320). At the same time, rats may serve an important seed disperser role where native seed dispersers have been extirpated (Shiels 2005, p. 142-145). Rodent populations may be suppressed by the brown treesnake in Guam, and threats to listed species from rats are expected to increase as brown treesnake suppression is implemented.

Invasive ants recently introduced to, or those at risk of being introduced to, the Mariana Islands are a potential threat to the habitat of these species. Invasive ant species prey on vertebrates and invertebrate eggs, pupae, larvae, and adults (Wild 2014, p. 1). Several species also facilitate plant pests such as aphids, white flies and scale insects, which feed on plant sap and secrete sugar-rich sticky liquid that the ants eat (Hawai'i Invasive Species Council 2021, p. 1). Many invasive ants including big-headed ants (*Pheidole megacephala*) and Argentine ants (*Linepithema humile*) eat a wide variety of plants and animals, and they would be expected to prey on the listed vertebrates

and invertebrates in the Mariana Islands (Farmer 2017, p.1). Aggressive invasive ants, defending nectar, ward off, and may prey on, invertebrate and vertebrate plant pollinators (Lach 2008, entire; Hanna et al 2015, pp. 222-228; SWCA 2020 in litt., pp. 9, 11, and Appendix C; Fuster et al. 2020, pp. 957-966; Unmi et al. 2021, pp. 1-5). Little fire ants (*Wasmannia auropunctata*) sting the skin and eyes of vertebrates causing welts, itching, and blindness (Hawai'i Invasive Species Council 2025, p. 1, CTAHR 2025, p.1). Invasive ants already introduced to the Mariana Islands include the ghost ant (*Tapinoma melanocephalum*), dwarf pedicel ants (*Tapinoma minutum*), tropical fire ants (*Solenopsis geminata*), white-footed ants (*Technomyrmex albipes*), bi-colored trailing ants (*Monomorium floricola*), and little fire ants. Where native invertebrate and vertebrate pollinators have dwindled, some non-native invertebrates may serve in some capacity as plant pollinators (Aslan et al. 2019, pp. 318-321). Yellow crazy ants (*Anoplolepis gracilipes*), which are becoming established on Rota and Saipan, and may occur on Tinian and Aguiguan, spray formic acid on nesting seabirds, causing deformities that affect vertebrate breathing and vision and cause seabirds to abandon the site (Plentovich et al. 2017, pp. 1, 3-7). The little fire ants occur in many areas on Guam and there is the potential for this species to be moved to other locations on Guam and to other islands via green waste and potted plants. Invasive ants are likely to directly or indirectly affect the listed species; the listed species and their habitats may not be able to persist in areas where ants disrupt ecosystem function by harassing, injuring, or killing native plant pollinators and vertebrates, including seed dispersers.

The native flora of the Mariana Islands consists of approximately 500 taxa, 10 percent of which are endemic. Over 100 plant taxa have been introduced to the Mariana Islands and at least one-third of these are invasive (Stone 1970, pp. 18–21; Mueller-Dombois and Fosberg 1998, pp. 242–243, 249, 262–263; Costion and Lorence 2012, pp. 51–100). The greatest risk posed by invasive plant species is the displacement of native plants. Invasive plants indirectly affect the listed species by degrading the habitat on which they depend and can directly outcompete the 14 listed plants. The establishment of invasive plants has led to significant changes to the native habitats in the Mariana Islands (Willsey, et al. 2019, p. 17) by reducing the availability of light, soil, water, and nutrients that native forest and savanna species require.

Because of rapid post-fire establishment of invasive grasses, wildfires in the Mariana Islands convert native forest and diverse native savanna to non-native grasslands and the grass provides fuel that increases the probability and intensity of subsequent fires (i.e., the grass-fire cycle) (Smith 1985, pp. 180–181 and 217-218; Cuddihy and Stone 1990, p. 74; D'Antonio and Vitousek 1992, p. 73; Ohba 1994, pp. 17, 28, 54– 69; Vitousek et al. 1997, p. 6-9; Mueller-Dombois and Fosberg 1998, pp. 242–243, 249, 262–263; Berger et al. 2005, pp. 45, 105, 110, 218, 347, 350; Willsey, et al. 2019, p. 17). Wildfires burn an annual average of 1.6 to 2.4 percent of the land area in the Northern Mariana Islands and 3.5 to 4.0 percent of land area of Guam (Minton 2006, p. 23; Dendy 2019 in litt.; Trauernicht and Kunz 2019, p. 1); in comparison, only one percent of California's land areas burns annually (Chodosh, 2018, p. 1). Wildfires in the Mariana Islands are primarily human-caused (Minton 2006, p. 3; Dendy 2019 in litt.; Demeulenaere 2020 in litt.). During severe droughts, which typically occur from February through June and during El Niño years (Aydlett 2017 in litt.), fires that are otherwise limited to grassy areas can burn into native forest and shrubland (Athens and Ward 2004, p. 18; Greenlee 2010 in litt., entire; Kunz 2018 p. 1; Dendy 2019, entire; Trauernicht and Kunz 2019 p. 1; Trauernicht and Chimera 2020, p. 1). Where native trees and shrubs are killed by fire, grasses

can outcompete native plant seedlings for light, water, and nutrients (Fosberg 1960, p. 40; Stone 1970, p. 184; D'Antonio, and Vitousek 1992, p. 68-70; Minton 2006 p. 21, pp. 25-29; NRCS 2011, p. 1; Johnson 2012, p. 27; Leary 2018, p. 3-4). Areas converted to grass facilitate the spread of future fires and reduce the area of remaining native forest each successive dry season (Fujioka and Fujii 1980 in Cuddihy and Stone 1990, p. 93; D'Antonio and Vitousek 1992, pp. 70, 73-74; Tunison et al. 2002, p. 122). The majority of fires on Guam historically occurred in the southern half of the island where they are routinely set by humans (Minton 2006 pp. 3, 20) and steep slopes make controlling fires difficult. Southern Guam was historically dominated by native ravine forest but by 2020, the area of ravine forest was reduced by more than 50 percent due to human-caused fires (Minton 2006, p. 23-30; Greelee 2010, entire; Camacho Fejeran 2021 in litt., p. 22). Because ungulate browsing removes much of the native forest's understory fuel, removal of ungulates from native forest can increase the site's vulnerability to the spread of wildfire (Bruns 2019, pers. comm).

The Mariana Islands occur in the world's most active typhoon basin, the western Pacific, and typhoons are a major threat to the listed species. Typhoons have direct and indirect effects to native species and the habitats on which they depend. Intense typhoon winds defoliate and uproot trees and/or break their primary branches and trunks. Forests can take several years to recover and during this time are susceptible to encroachment from invasive trees, shrubs, and vines (Marler 2001, p. 1). After typhoons, more light penetrates forests because of damage to or loss of vegetation, which benefits invasive plant species, which in turn alter basic soil hydrology and nutrient cycling (Willsey et al. 2019, p. 18; Polhemus and Richardson 2019, pp. 3-4; Kerr, 2020, entire). "Dry" typhoons, which are characterized by very little rainfall, carry salt spray inland, which causes many tree species to drop their leaves within 2 days of a storm and can result in tree mortality (Kerr 2000, p. 895). Tree mortality when followed by a drought can increase the likelihood and intensity of wildfires (Aydlett 2017 in litt., pp. 5-6). Such catastrophic events can lead to the direct loss of a listed species or degradation/loss of the habitats needed for their conservation. Species with small populations or those with narrow distributions are particularly vulnerable to such catastrophic events. The habitats needed to support the listed species are susceptible in varying degrees to typhoons. Future sea surface temperature increases are expected to result in increased typhoon intensity in the Mariana Islands (Camargo 2013, p. 9896; Kossin et al. 2014, p. 350; Zhou et al 2019, entire; Grecni et al. 2021, p. 5) which is expected to result in further degradation and loss of habitat for the listed plant and animal by favoring invasive, disturbance-tolerant, species. At the same time, poleward migration of typhoon tracks (Lin et al. 2023, entire) may result in decreased typhoon frequency in the Mariana Islands. More extreme El Nino events (Grecni et al. 2021, p. 23) may exacerbate wildfire threat, alter stream flows, and change microclimate and suitability of sites for persistence of the habitats needed to support the listed species. Anticipated sea level rise and coastal erosion (Grecni et al. 2021, p. 27) are expected to remove low-lying and coastal sites from future terrestrial species conservation use in addition to, synergistically with typhoons (Grecni et al. 2021, pp. 32-33), complicating logistics of conservation efforts. Current models indicate, under a very low greenhouse gas emissions scenario (SSP 1-1.9), global mean sea level, relative to the 1995-2014 period, is likely to rise 0.15-0.23 m (0.49-0.75 ft) by 2050 and 0.28-0.55 m (0.91-1.8 ft) by 2100, while under the very high greenhouse gas emissions scenario (SSP5-8.5) global mean sea level would be expected to rise 0.20-0.29 m (0.66-.95 ft) by 2050 and 0.63-1.01 m (2.07-3.31 ft) by 2100 (IPCC 2023, p. 45). Sea level rise in the Mariana Islands

is expected to be 15-20% higher than the global average (Grecni et al 2021, p. 23). Low-lying coastal areas will become uninhabitable to the terrestrial listed species and their habitats.

Disease and Predation: The introduction of the brown treesnake caused significant ecological damage to Guam including the extirpation/extinction of many of the island's birds and other small animal species. Survey data gathered between 1976 and 1998 indicated that the brown treesnake had severely affected 2 native bat species, 4 native lizard species, and 13 (59 percent) of Guam's 22 native bird species (Wiles et al. 2003, p. 1,358; Rodda and Savidge 2007, p. 307).

Invasive herbivorous invertebrates including slugs, caterpillars, scale insects, and leaf miners directly and indirectly affect the listed species and their native habitat. Due to their predatory characteristics, invasive insects including the little fire ant are expected to constitute a high degree of threat to the fanihi and its habitat. Little fire ants sting the skin and eyes of vertebrates causing welts, itching, and blindness (Hawai'i Invasive Species Council 2025, p. 1, CTAHR 2025, p.l). Aggressive invasive ants, defending nectar, ward off, and may prey on, invertebrate and vertebrate plant pollinators (Lach 2008, entire; Hanna et al 2015, pp. 222-228; SWCA 2020 in litt., pp. 9, 11, and Appendix C; Fuster et al. 2020, pp. 957-966; Unmi et al. 2021, pp. 1-5). Slugs are a threat to native habitats. Herbivory by slugs can result in the death of individual plants, especially seedlings (Joe and Daehler 2008, entire).

Inadequacy of existing regulatory mechanisms: Inadequate local regulatory mechanisms or failure to enforce these regulations, allows for the development and degradation of habitats occupied by the listed species and do not address biosecurity and the spread of invasive species. Local laws and interdiction efforts are inadequate to prevent intentional or accidental introduction of ungulates, the little fire ant, and other non-native invasive species and the intentional and accidental ignition of wildfires that burn habitat needed for the recovery of these species.

Landscape-scale conservation reducing some of these threats in Guam. The *Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam's* permanent removal of 1,334 ac (540 ha) of the remaining 15,089 ac (6,106 ha) sihek habitat in north Guam was offset with the permanent protection of 4,817 ac (1,949 ha) of sihek habitat (an offset ratio of 3.6 acres conserved per acre removed). The action was addressed in the *Biological Opinion for the Department of the Navy's Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam* (USFWS 2015a), and a June 2015, Memorandum of Agreement (MOA) between the USFWS and Department of the Navy, updated December 2015, memorialized DOD's conservation, to a status that will provide durable habitat protection, of land totaling 5,234 ac (2,118 ha).

The following management actions are ongoing at Andersen AFB. Full descriptions and regulatory drivers are included in Appendix C of the JRM INRMP (DON 2022):

- HMU brown treesnake (*Bioga irregularis*) barrier inspections and maintenance
- Brown treesnake monitoring and control in the HMU
- Non-native plant removal and control in the HMU

- Little fire ant (*Wasmannia auropunctata*) early detection surveys as well as control and eradication (if detected).
- Coconut rhinoceros beetle (*Oryctes rhinoceros*) interdiction (including trapping and breeding site removal)
- Invasive species early detection surveys (including roadside weed surveys and all taxa surveys in cargo staging areas) and control/eradication of newly detected high-risk species
- Biosecurity arrival and pre-departure inspections of military training cargo and equipment
- fanihi monitoring
- Monitoring and conservation of *Cycas micronesica*
- Native forest habitat restoration in ungulate-fenced areas
- Ungulate fencing construction, inspection, and maintenance at various sites
- Ungulate eradication and control within fenced areas
- Environmental education outreach and awareness program for military personnel and their families

Species-Specific Status of the Species

Status of the Fanihi

Species description

The fanihi was listed as endangered in 1984 but later reclassified to threatened in 2005 when it was determined that all fruit bats throughout Guam and the Commonwealth of the Northern Mariana Islands (CNMI) comprise a single endemic subspecies (70 FR 1190, January 6, 2005). In 2004, critical habitat for the fruit bat was designated at the Guam National Wildlife Refuge (GNWR) in the Ritidian Unit (69 FR 62944, October 28, 2004).

The fanihi is a medium-sized fruit bat in the family Pteropodidae with dark brown to black leathery wings and a wingspan of 34 to 43 in (86 to 109 cm). Individuals weigh between 0.73 and 1.27 lbs (330 and 577 grams) and male fanihi are slightly larger than females. The abdomen is black to brown with gray hair interspersed, creating a grizzled appearance. The mantle and sides of the neck are bright golden brown but can be paler in some individuals, and the head is a brown to dark brown. The well-formed, rounded ears and large eyes give the face a canine appearance (USFWS 2009, p. 4).

The paleotropical genus *Pteropus* is represented by approximately 63 species distributed across the Indian Ocean, Southern Asia, Australia, and Oceania, as far east as the Cook Islands (Almeida et al. 2014, p. 83). Six species of *Pteropus* are extinct while 42 species are considered critically endangered, endangered, threatened, near threatened, or vulnerable under the definitions of the International Union for Conservation of Nature and Natural Resources (IUCN 2021). Most *Pteropus* fruit bats occur on islands or in coastal areas (Almeida et al. 2014, p. 84). Although it was previously thought that two subspecies of fruit bat may have inhabited the Mariana Islands (Flannery 1995, p. 266; Simmons 2005, p. 340), subsequent genetic analyses conducted by Brown et al. (2011) and Mildenstein and Mills (2013) indicate *Pteropus mariannus mariannus* is a single subspecies. In addition to the fanihi, there are subspecies of *Pteropus*

mariannus endemic to other island chains, including the Caroline Islands and the Palau archipelago (Brown et al. 2011, p. 934).

Life history

Fanihi do not use laryngeal echolocation, instead relying on vision and smell to avoid obstacles and locate food sources (Almeida et al. 2014, p. 83). The diet of the fanihi is comprised of fruit, nectar, pollen, and some leaves from at least 45 different plant species (Mildenstein and Johnson 2017, pp. 38–41). The bats rapidly digest and metabolize food and rely on forest habitat with diverse food resources to be available throughout the year (USFWS 2009, p. vii). The foraging behavior of the fanihi has not specifically been assessed, but bats in similar habitat are known to visit two to five fruit trees per night, making five to seven flights of 492 to 2,625 ft (150 to 800 m) between the fruit trees, for an estimated maximum nightly travel distance of 0.6524 to 2.485 miles (mi) (1.05 to 4 kilometers [km]). During their nights away from their day roost tree, fruit bats can also fly for longer periods in search of new food sources and spend long periods roosting in trees other than fruit trees (Morrison 1980, pp. 22–24). Fanihi use several forest types for foraging, roosting, and breeding, including native primary and secondary limestone forests, volcanic or ravine forests, old coconut plantations, and groves of *Casuarina equisetifolia* (Glass and Taisacan 1988, pp. 11–12; Worthington et al. 2001, p. 137; Wiles and Johnson 2004, pp. 589–591), and may also use grasslands with trees (Wiles and Johnson 2004, p. 590). Most fanihi roost during the day at sites to which they show a high level of fidelity, unless disturbed. A small proportion of fanihi, usually males, roost alone or in small groups called bachelor colonies. Colonies established by one or more bats can grow to over 1,000 individuals. A day roost occupied by one or more female bats is considered a maternal colony. Within maternal colonies, fanihi typically group themselves into harems of one male and 2–15 females (Wiles 1987, p. 93). fanihi vocalize readily within colonies and when roosting.

Population dynamics

Based on three years of field observations in Guam, female fanihi were observed to rear up to one pup annually, with a gestation period of approximately 4.6 to 6.3 months (Pierson and Rainey 1992, p. 1; USFWS 2009, p. 17). Many *Pteropus* species typically do not give birth until 18 to 24 months of age (Pierson and Rainey 1992, p. 1; McIlwee and Martin 2002, p. 79). The age of sexual maturity is not known for *Pteropus mariannus mariannus* but mating and the presence of nursing young have been observed year-round (Perez 1972, p. 145; Wiles 1987, p. 94). The mother bat carries her bat pups until they become too heavy. When the non-volant young bats are not yet well developed enough to fly on their own, they are left at the maternal roost when the parents forage at night.

The natural lifespan of the fanihi is also unknown, but evidence suggests *Pteropus* species are long-lived, with lifespans of 10 to over 20 years recorded (McIlwee and Martin 2002, p. 80). Based on this demographic information, several authors have suggested that *Pteropus* bats have a low maximum population growth rate and thus a slow rate of recovery when populations are diminished (Pierson and Rainey 1992, p. 13; McIlwee and Martin 2002, p. 91).

Status and Distribution

Our 2020 population estimate for the fanihi of between 3,500 and 4,000 individuals suggested the species was stable overall throughout its range (USFWS 2020a, p. 4). The fanihi has been

found on all the Mariana Islands except for Uracas, the northernmost island (Wiles et al. 1989, p. 69). While the species has been thought to be extirpated from Tinian (USFWS 2020a, p. 4), a fruit bat was sighted on the island in 2022 (NAVFAC Marianas 2022, p. 23). Similarly, while there have been anecdotal sightings of fruit bats in Farallon de Medinilla in recent years, the last recorded sightings were in the 1970s (Wiles et al 1989, p. 71). Fanihi are strong fliers and highly mobile, and small groups have been observed flying over the ocean between islands (Wiles and Glass 1990, entire; Wiles and Johnson 2004, p. 593). Distribution of occupied roost sites has fluctuated greatly in the southern islands and may be attributed to not only variations in survey methods and coverage, but also movements of fruit bats between islands. Surveys are sporadic on most islands except Rota and Guam, which are now surveyed annually.

Guam:

Other than a few isolated periods of increase, fanihi have been declining in Guam since the early 1900s (Wiles 1987, entire; USFWS 2009, pp. 6–8). By the 1980s, most fanihi on the island lived in a single colony in northern Guam which occasionally divided into smaller aggregations (Wiles and Glass 1990, p. 2; Mildenstein and Johnson 2017, p. 25). From 1981 to 2008, fruit bat population estimates were made by the Guam Division of Aquatic and Wildlife Resources (DAWR) via opportunistic counts at known roosting locations on Andersen Air Force Base (AAFB; Mildenstein and Johnson 2017, p. 23). By 1995, nearly all of Guam's remaining fruit bats occurred at Pati Point on AAFB (Wiles et al. 1995, p. 39). Fruit bat abundance at Pati Point declined after annual surveys began in 2005, and, by 2010, regular clustering of bats at the site had become intermittent. In 2006, the only known maternal colony in Guam was located at Pati Point and had less than 100 individuals (Mildenstein and Johnson 2017, p. 25). By 2010, the Pati Point colony no longer existed (SWCA 2013, p. 30), and no other colonies were known in Guam.

From 2010 to 2013, SWCA Environmental Consultants performed fruit bat surveys on AAFB consisting of pre-dawn, timed (2 to 3 hour) visual surveys at 83 forested locations and direct colony counts at historical colony locations within AAFB (SWCA 2013, entire). Since 2014, a collaborative monitoring effort between the University of Guam and AAFB has produced simultaneous, multi-observer (>80), base wide counts yielding annual abundance estimates of fanihi on AAFB. Compilations of Pati Point fruit bat survey data are shown in Figures 5 and 6.

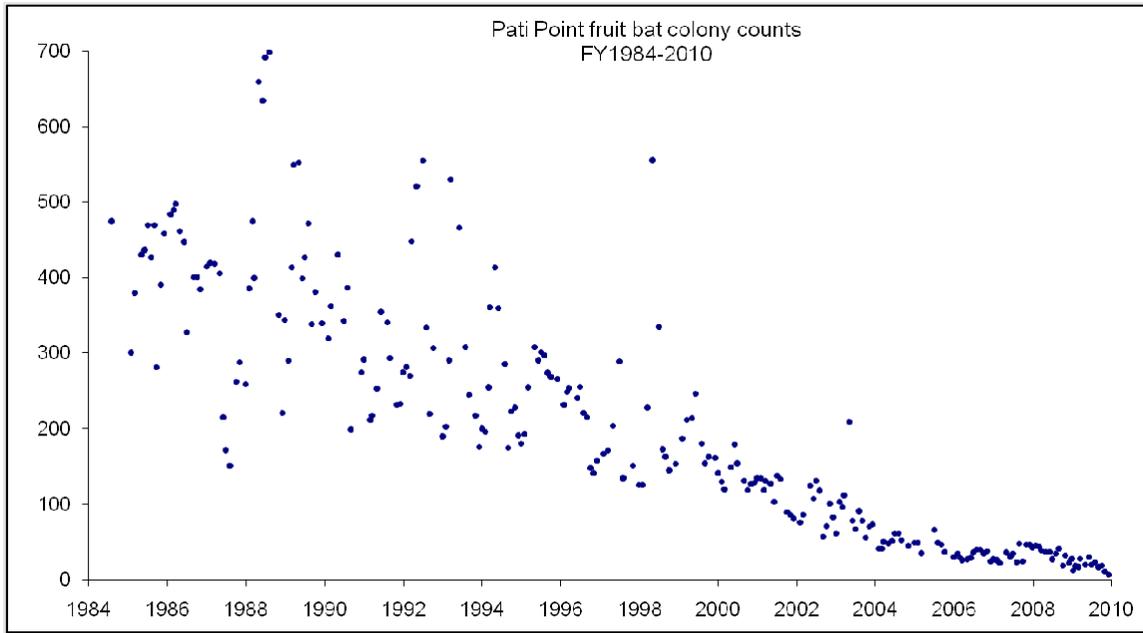


Figure 5. Fanihi counted at the Pati Point colony, AAFB, Guam: 1984 to 2010. Source: DAWR unpublished data.

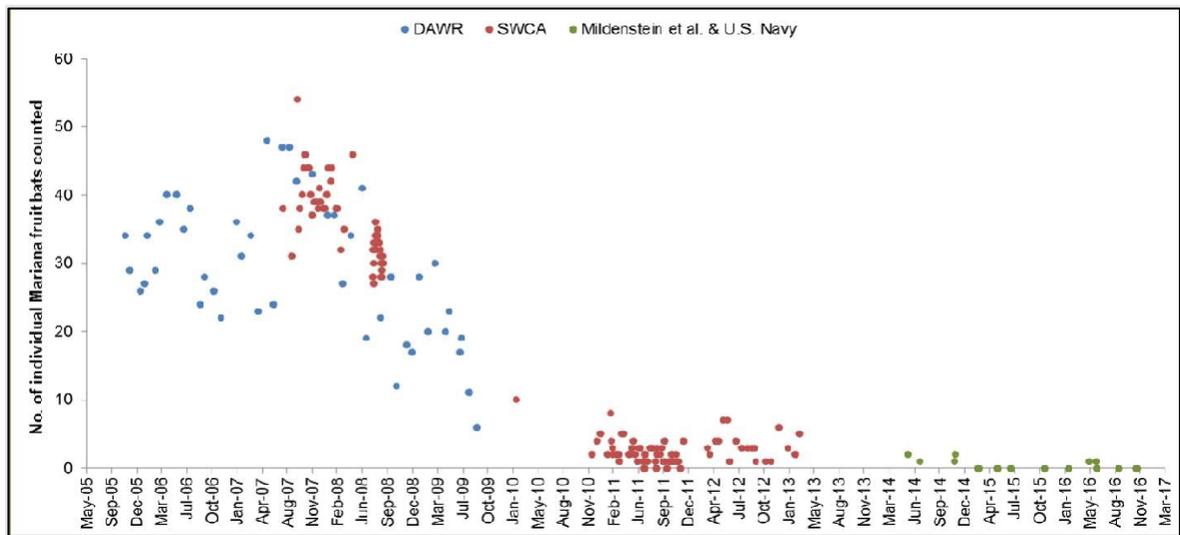


Figure 6. Fanihi colony counts at the Pati Point colony, AAFB, Guam: October 2005 to September 2009; December 2010 to December 2011; March 2012 to March 2013; and May 2014 to November 2016. Source: Mildenstein and Johnson (2017).

After a decade persisting at very low numbers, the Pati Point location is being recolonized in larger numbers (See Figures 5 and 6). The most recent survey of the Station 67, [REDACTED] in December 2024, documented 214 fanihi at the site (Duenas pers. comm. 2024).

Observations of fanihi pups on Guam is rare, and this rarity may indicate that there is limited reproduction or limited survival of young bats on Guam. There is no data, however, to assess the

population age distribution or survival rates of bats of various age classes on Guam. Population levels fluctuate regularly as fanihi move locally between sites and between Rota and Guam. Mating bats were acoustically documented in June and November 2023; in February 2024, mating bats and bat pups, estimated to be between 1 and 2 months of age, were documented via a spotting scope and long-range telephoto lens (Mildenstein 2024). Fanihi reproduction can occur at any time of the year on Guam, and pups were historically observed year-round (Wiles 1987).

Across AAFB, the number of bats counted in base wide surveys has been incrementally increasing (Figure 7), potentially due to increased survey effort. The acreage surveyed during the AAFB annual surveys has generally increased since 2014, reaching a high of 8,635 ac (3,494 ha) of fruit bat habitat surveyed in 2021, during which 64 bats were detected. The 2021 survey covered approximately 32 percent of the total fruit bat forest habitat in Guam. Searches cover all areas where, based on visual sightings of flying bats, bat occurrence is suspected. Commensurate to the yearly increase in survey area, for most years, there has been an annual increase in the number of bats detected. ManTech International, Inc. 2024 (p. 2-8) indicates “Base-wide surveys show an increase in bats from eight bats counted in 2014 to 68 bats in 2022. The population has remained somewhat stable with recent surveys in 2020, 2021, and 2022 estimating a population size on AAFB of 73, 108, and 124 individuals, respectively (Naval Facilities Engineering Command Marianas, 2020, 2022, 2023). According to the Mariana Fruit Bat 5-Year Review, there were approximately 82 fanihi estimated to inhabit the 212 square miles of Guam (DAWR 2020 in USFWS 2020a).”

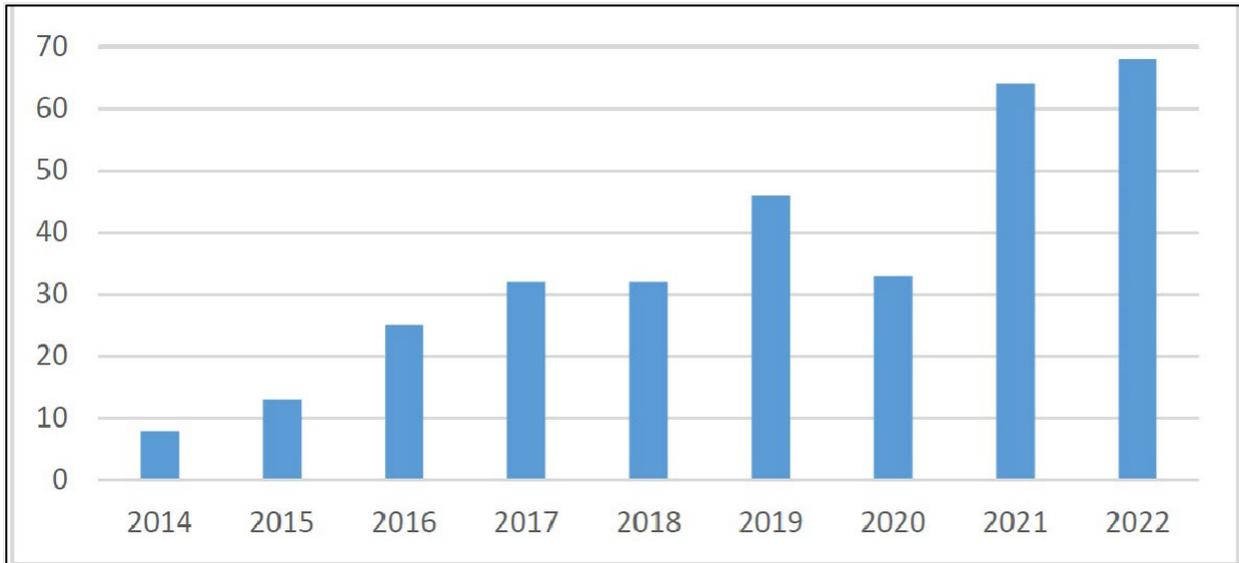
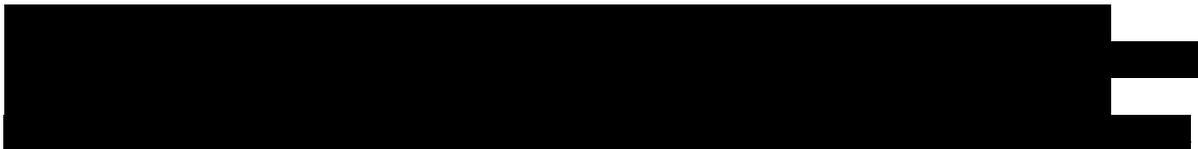


Figure 7. Recent Andersen Air Force Base fanihi surveys show an increase in number of bats counted, from 8, in 2014, to 68 bats in 2022 (from ManTech International, Inc., 2024 p. 2-8).



The 2022 AAFB surveys report indicate a potentially cyclic migration of bats between Rota and Guam in 2021 and 2022 (NAVFAC Marianas 2022, pp. 212–213). In January and February of both years the fanihi population on AAFB increased—to an estimated 200 bats in 2021 and to 1,300 bats in 2022—after which the population decreased to lower year-round numbers in March and April as result of likely migration.

Our current estimate of fanihi in Guam fluctuates considerably but appears to be stable to increasing. There are currently between 100 and 300 fanihi on Guam during non-peak months (USFWS 2020a, p. 4, Duenas pers. comm. 2024), and approximately 1,300 bats during peak periods.

Rota:

The largest fanihi population is in Rota. From 2012 to 2019, Rota's population averaged between 2,500 and 3,000 bats, with peaks after major typhoons (DFW 2019, entire); our 2020 estimate was approximately 3,000 individuals (USFWS 2020a, p. 4). In 2014, Rota's fanihi populations had increased due to increased enforcement of anti-poaching regulations at maternal colonies (USFWS 2014, p. 2). A small percentage (fewer than one third) of Rota's fanihi population is temporarily roosting on the other southern islands. This appears to include a seasonally (January through February) movement to Guam, and movements in response to localized habitat degradation on one island or another by typhoons. Rota is considered to be a source population, supporting temporary occurrences and augmenting more permanent occurrences on the other southern islands. The Rota population is therefore of considerable importance to the long-term stability of the species (Wiles and Glass 1990, p. 6; Wiles et al. 1995, p. 41). In DFW 2023, p. 8 FW's FY23 report, 1,929 bats were found on Rota, indicating many of the animals were likely on another island at the time of the survey.

Saipan and Tinian: An estimated 200 fanihi temporarily roosted at a single site on Saipan in early 2024, followed by a decline down to five individuals (Curry, pers. comm, 2024). Numbers fluctuate as fanihi arrive and depart in their interisland movements; currently five fanihi are roosting on Saipan (Curry, pers. comm, 2024). At the time of listing, in 1983 and 1984, there were fewer than 25-50 fanihi on the islands of Saipan and Tinian. Numbers increased to an estimated 75 to 100 individuals in Saipan in 1986 (Wiles and Glass 1990, p. 2).

The Northern Islands:

The most recent surveys, conducted in 2010 (DFW 2023, p. 8) report the following population estimates for the northern islands of the CNMI: "The overall maximum number of bats counted on Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrihan, Asuncion, and Maug combined, totaled 3,078 bats. The greatest number of individuals documented in 2010 for any island was for Pagan (1,017), followed by Agrihan (858), Asuncion (573) Guguan (226), Sarigan (157), Anatahan (150), Alamagan (86), and Maug (11)."

At the time of listing, in 1983 and 1984, there were fewer than 25-50 fanihi on Aguihan. Numbers increased to an estimated 300 individuals in Aguihan by 1988 (Wiles and Glass 1990, p. 2). There is evidence for a possibly increasing population on Asuncion (Valdez 2010, p. 33), last surveyed in 2010, and Alamagan. The Alamagan population increased from 86 bats in 2010 to an estimated 385 bats in 2017 in 3 colonies (Murray et al. 2018, entire). Around 249 bats were

estimated on Guguan in 2016 (Liske-Clarke et al. 2016, p. 25). The fanihi are likely to transit among the northern islands as a metapopulation, as they do in the southern islands.

Threats

The following threats to the fanihi contributed to its listing and continue to impact the ability of the species to recover. Fanihi show a strong tendency for roost site fidelity, often returning to the same roost tree year after year to raise pups. However, prolonged or severe disturbance can result in abandonment of the roost location.

Loss and degradation of habitat: The fanihi's forest habitat is vulnerable to loss and degradation by habitat clearing, wildfire, invasive vertebrates and invertebrates, invasive plants, and human activity and noise in the Mariana archipelago (USFWS 2009, p. 33; USFWS 2014, p. 3). The degradation of intact native forests in particular limits the persistence and population size of the fruit bat because these forests provide essential foraging and roosting resources that may not otherwise be found in nonnative and agricultural habitats. In Guam's remaining native forests, ungulate browsing has been shown to reduce the presence and recruitment of breadfruit, an important food for fruit bats, as ungulates consume both fallen fruit and seedlings (Wiles 2005, entire). Economic development has caused habitat loss and fragmentation on all inhabited southern islands, and all islands with military activity, which has reduced the opportunities for bats to shift the location of their roost sites and foraging activities in response to human disturbance (USFWS 2009, p. 31). The quality of bat habitat is further degraded by the presence of invasive habitat-altering predators, as detailed in the general threats section.

Nonnative snake and insect predation: Fanihi are vulnerable at their roosts and in foraging habitat to predation by the arboreal brown treesnake (*Boiga irregularis*), and disturbance from arboreal little fire ants (*Wasmannia auropunctata*). Brown treesnakes may prey on non-volant young left at the roost during the night and reduce the recruitment of young bats into the breeding population (Wiles 1987, p. 94). Brown treesnake visitation to a roost is expected to cause the roosting bats to take flight. Where young bats are unable to fly or be carried by the mother bat, the brown treesnake may prey on ~~prey on~~ non-volant young left at the roost. This is expected to reduce roost site suitability and cause the bats to vacate the roost. It may also ~~during the night and~~ reduce the recruitment of young bats into the breeding population. Effective control of the invasive brown treesnake must be achieved for the fanihi population in Guam to recover (Wiles 1987, p. 94). Efforts to interdict, control, and ultimately eradicate the brown treesnake are ongoing.

Likewise, we anticipate fanihi will abandon roost sites that are infested by little fire ants. Although we are not aware of documented instances of little fire ant direct interactions with fanihi, we believe, based on the arboreal predatory behavior of this species and its impacts to other vertebrates, fanihi are among the species these ants prey upon. Little fire ants sting the skin and eyes of vertebrates causing welts, itching, and blindness (Hawai'i Invasive Species Council 2025, p. 1, CTAHR 2025, p. 1). Aggressive invasive ants, defending nectar, ward off, and may prey on, invertebrate and vertebrate plant pollinators (Lach 2008, entire; Hanna et al 2015, pp. 222-228; SWCA 2020 in litt., pp. 9, 11, and Appendix C; Fuster et al. 2020, pp. 957-966; Unmi et al. 2021, pp. 1-5).

Human Disturbance and Noise:

Because fanihi are poached for their meat, as detailed below, they tend to avoid humans they hear and detect via scent. Fanihi are expected to detect audible, higher-frequency (high-pitched) sounds (above 20 Hz), such as voices of humans and birds, and inaudible low-frequency sounds, 0-20 Hz such as those produced by jet aircraft, rocket launches, earthquakes, volcanoes, big-wave surf, whales, elephants, and other sources. Exposure to a 60 dB sound at any frequency may elicit physiological responses in animals (Awbrey and Hunsaker 1997 p. 1; Mock and Tavares 1997, p. 1; Rand et al. 2011, p. 361, Walker et al. 2012 Appendix C pp 35-36, Bednarz 2021, pp. 323-328; Alves et al. 2020, pp. 4-23). SWCA (2008, p. 31) summarizes fanihi reactions to aircraft noise in the following manner:

“Mariana fruit bats were observed reacting to aircraft overflights on some occasions but not others. There were no instances of complete colony flushing or abandonment. Colony flushing was expected to be at least 15 percent, based on Morton’s (1996) results, but the current study found flushing episodes were infrequent at less than 5 percent for overflights louder than 75 dBC and 6 percent for overflights louder than 100 dBC. In a previous study, up to 42 percent of the Mariana fruit bat colony flushed in response to aircraft overflights (Morton 1996). In both the current study and previous studies (Grout 1993, Morton 1996), individuals were in flight for a relatively short period (<10 minutes) and generally resettled prior to the commencement of the next scan. Flush rates, thus, may not adequately reflect species sensitivity to human disturbance and should only be used as a management guide in conjunction with other indices such as spatial distribution (Peters and Obis 2006). Almost 60 percent of all flush events were from aircraft that departed from the north, rather than the south runway. In all instances where more than one bat flushed, aircraft had departed from the north runway. There are a number of reasons why we would detect a difference in flushing frequency between the north and south runways. First, the northern runway was closer (approximately 750 meters) to the fruit bat colony than the southern runway (approximately 1000 meters). This could result in aircraft flying over the colony at a lower altitude than southern runway departures, and 2) aircraft departing from the north runway are more likely to fly directly over the fruit bat colony.

Disturbance by overflights is not an ‘all or nothing’ response. Severe reactions such as panic or escape behavior (i.e., flushing) may not be observed in a colony, but that does not mean that individuals are physiologically undisturbed by the overflight. Mild responses such as slight changes in body position may occur but be overlooked as inconsequential. Further, researchers have concluded that one of the primary direct effects to wildlife by noise is expected hearing loss (Krausmann et al., 2004). We have no way to gauge the possibility of hearing loss to the Guam fruit bat colony. Other responses, such as elevated heart rate, cannot be observed but have been demonstrated to be affected by low altitude overflights (MacArthur et al., 1982; Workman et al., 1992a, b, c; Harms et al., 1997; Krausman et al., 1998). Previous research has demonstrated that disturbance can be cumulative; low level disturbance can lead to chronic stress. Without the use of an internal heart rate transmitter (Harms et al., 1997, Krausman et al., 1998), physiological effects of aircraft overflights on Mariana fruit bats cannot be

determined. Additionally, alertness or changes in body position may unknowingly occur during individual scans of the colony but are unnoticed because the bat that may have exhibited this behavior was not the focal bat during the scan (i.e., the behavior was missed by the observer while another bat was under observation).”

Previously, the ISR Strike project increased aircraft use near the Pati Point fanihi colony in 2008 may have contributed to the temporary abandonment of that site (SWCA 2012, p. 61). Fanihi may either acclimate / habituate to disturbance or disturbance may further sensitize the animal, causing it to further avoid the disturbed area. Janeke (pers. comm. 2021, as cited by Cobb 2025 pers. comm) noted fanihi not having a noticeable response to the noise of jet aircraft takeoffs. Cobb (pers. comm 2025) further indicated the fanihi appear to have habituated to live-fire training and aircraft operations.

Poaching: Illegal hunting has long threatened the persistence of the fanihi throughout its range, particularly in Rota. Because of access controls on military installations, fanihi on and in the vicinity of MCBCB and neighboring AAFB are afforded some relief from poaching. The presence of increased law enforcement activity has been shown to positively impact population numbers but has not eliminated poaching (USFWS 2014, p. 3). Hunting has greatly contributed to the decline of fruit bat populations in Rota, Saipan, and Guam (Wiles and Payne 1986, entire; Wiles and Glass 1990, pp. 2–4; Sheeline 1991, pp. 6–7; Stinson et al. 1992, entire; Esselstyn et al. 2006, entire). Monitoring of illegal hunting and law enforcement on the northern islands are limited.

Stochastic events: Typhoons and volcanic eruptions result in mortality, reduced population viability, and habitat loss. Natural disasters can be especially damaging to the viability of smaller fanihi populations such as those in Guam, Saipan, Aguiguan, and Maug. The significant loss of habitat on Anatahan after a volcanic eruption in 2003 caused the loss of a substantial fanihi population that is not known to have recovered.

Survival and Recovery Needs

The Draft Revised Recovery Plan for the Mariana Fruit Bat or Fanihi (USFWS 2009) calls for the following criteria to be met for delisting. The first criteria identifies the total fanihi population has increased and individual subpopulations are stable to increasing so that the probability of fanihi persistence over 100 years is high (at least 90 percent). Criteria 1 further identifies that stable or increasing fanihi subpopulations should be distributed across at least three of the five southern islands (Saipan, Tinian, Rota and Guam), and six of the eight northern islands. Of the six northern islands with stable or increasing trends, two of these must include Pagan, Anatahan, or Agrihan (the three largest of the northern islands). Additionally, threats, including habitat loss and degradation, hunting, brown treesnakes, and development and military training activities, must be managed to allow for Criteria 1 to be achieved (Criteria 3-6).

Priority Conservation Actions

The USFWS has identified priority conservation actions for fanihi that are necessary for their conservation and recovery (adapted from USFWS 2009, p. 42-44):

1. Immediate management to reduce risks and stabilize the existing population.

2. Specific actions to reduce or eliminate illegal hunting to allow increase in fanihi numbers throughout the archipelago.
3. Protection of the best existing habitat and enhancement of additional suitable habitat.
4. Effective control and interdiction of the brown treesnake.
5. Research to address gaps in our knowledge of fanihi life history and ecology and improve our ability to model the population, assess its sensitivity to specific threats and management actions, and forecast its persistence.

Environmental Baseline – Fanihi

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated and/or ongoing impacts of all proposed federal projects in the action area that have undergone Section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

Status of the fanihi within the action area

Fanihi habitat in northern Guam consists of native and non-native vegetation and developed areas. Native and non-native vegetation is used by bats for bat roosting, feeding, breeding, transiting, resting, and day roosting. Fanihi on Guam has been detected near AAFB. ManTech International, Inc., 2024 p. 2-9 mapped a compilation of fanihi observations (Figure 8).

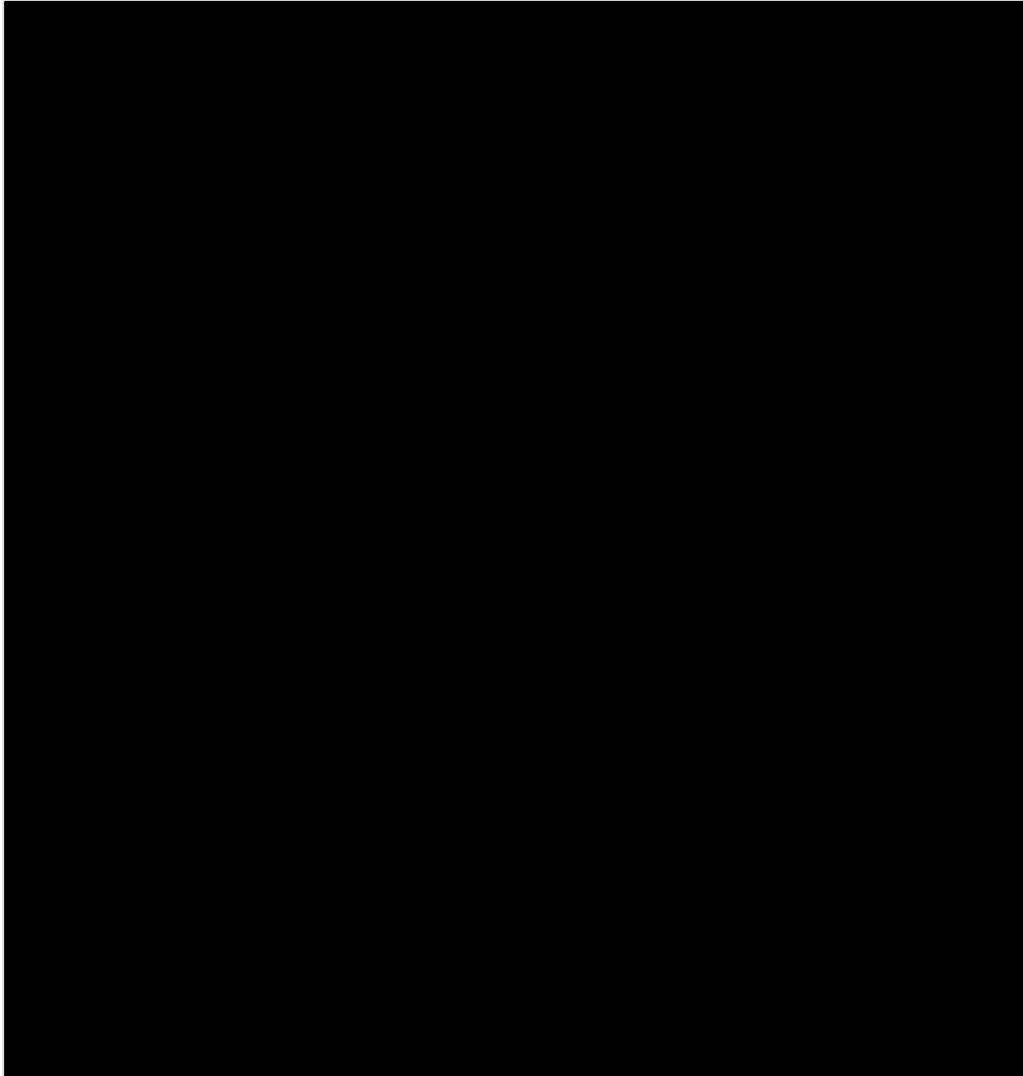
The BA (p. 34) provides a thorough summary of recent fanihi occurrence in the close vicinity of the proposed project location:

“Historically, most of the Guam fruit bat population was located at Pati Point, below the northern runway of Andersen AFB; however, it was noted that this colony was in decline in 2002, with fewer than 100 individuals observed in 2003 (SWCA 2012). Since 2014, small bat aggregations have been detected at Pati Point, the HMU, the valley between Tarague and Tagua Points, the karst ravine area north of the Explosive Ordnance Disposal building (Building 2600), and along the cliff line above the Combat Arms Training and Maintenance (CATM) Range (NAVFAC Marianas 2017).

[REDACTED] Since the roost site was discovered, now referred to as the Station 67 roost area, it has been subject to more frequent monitoring and was still active in early 2024 (Andersen AFB 2024). Andersen AFB is implementing the 2017 Mariana Fruit Bat Management Plan for Andersen Air Force Base, Guam (NAVFAC Marianas 2017), which includes base-wide annual bat population assessments to locate colonies and assess flight paths; quarterly Pati Point monitoring; and preconstruction surveys to determine presence/absence of individuals. Base-wide surveys conducted between 2017 and 2023 recorded the following population sizes for the entire installation (University of Guam 2024):

- 2017: 32 bats recorded; estimated population size of 57 to 68 individuals
- 2018: 32 bats recorded; estimated population size of 57 to 76 individuals
- 2019: 46 bats recorded; estimated population size of 85 to 99 individuals

- 2020: 33 bats recorded; estimated population size of 69 to 92 individuals
- 2021: 64 bats recorded; estimated population size of 108 to 126 individuals
- 2022: 68 bats recorded; estimated population size of 115 to 137 individuals
- 2023: 46 bats recorded; estimated population size of 70 to 85 individuals”



The BA provides the additional details about fanihi activity and noise in the project footprint vicinity:

“Routine monitoring began at Station 67 in October 2020, with multiple bat surveys conducted each month. Between October 2020 and August 2023, more than 75 monitoring events have recorded nearly 6,500 bat detections that averaged approximately 85 bats, with the highest number of bat detections on a single day in February 2022 with 698 bats observed (Figure 9). Since regular monitoring at Station 67 began, a seasonal period of increased bat numbers has been observed, typically between November and February.

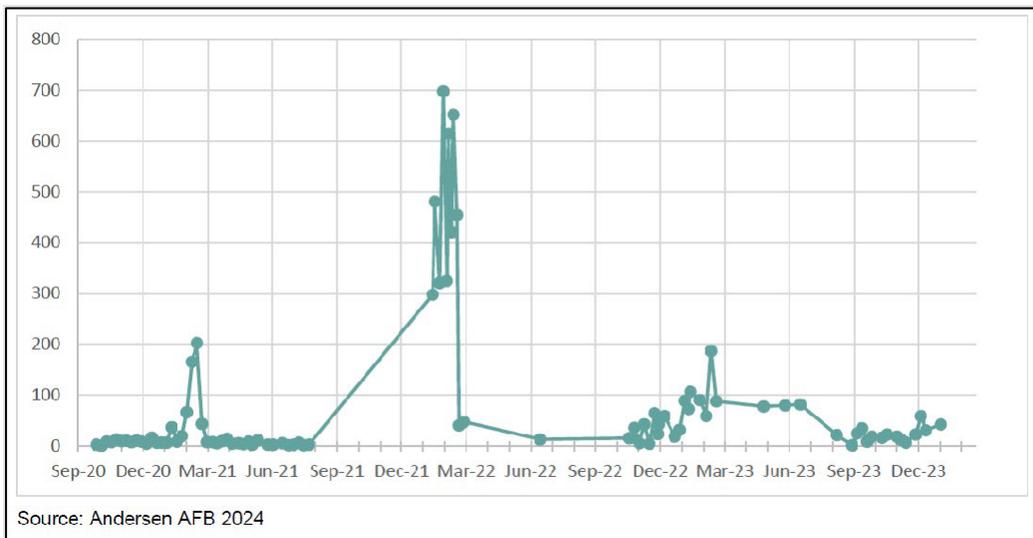
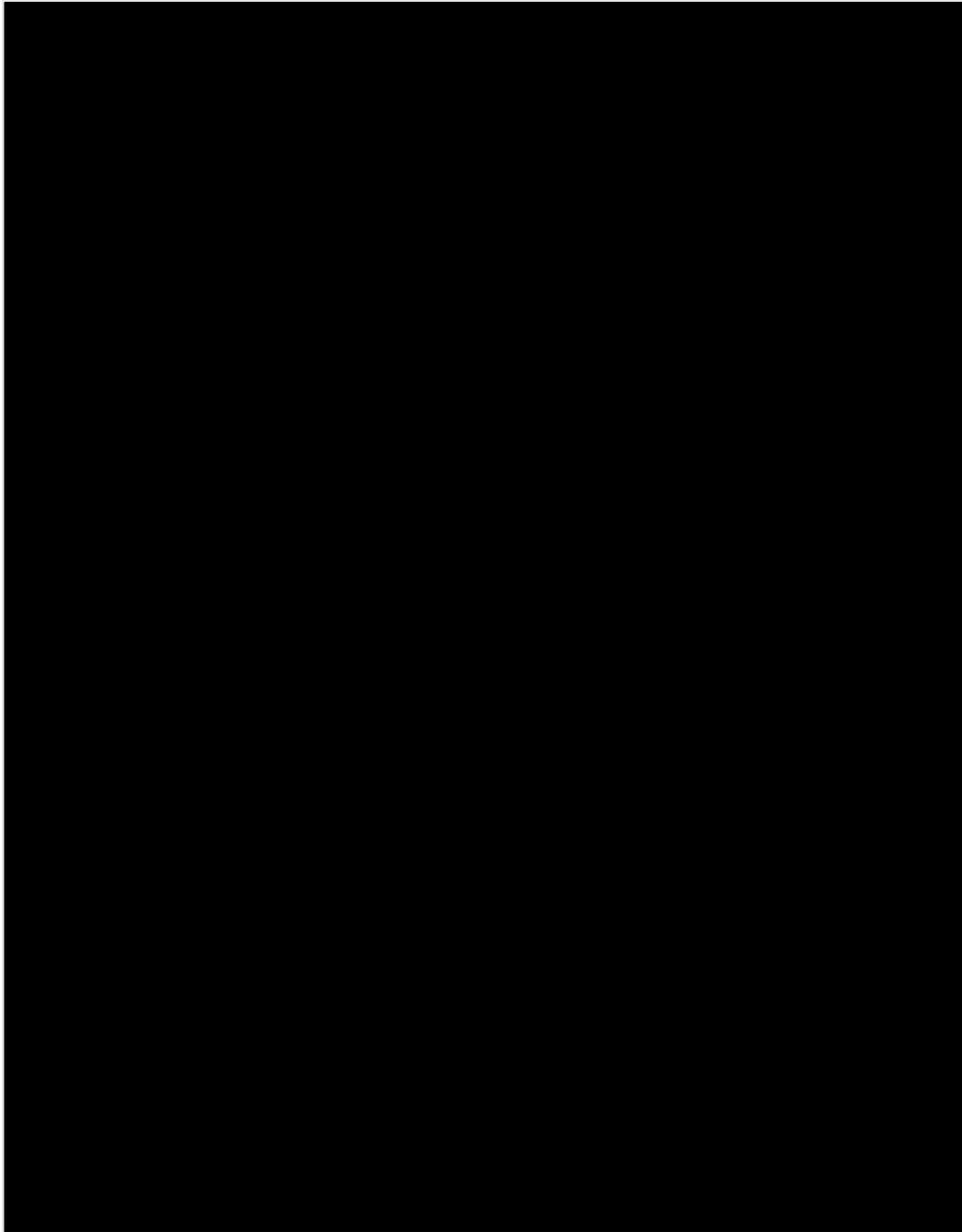


Figure 9. Fanihi observations at Station 67, Pati Point, 2020 through 2023.

Mating bats were acoustically documented in June and November 2023; in February 2024, mating bats and bat pups, estimated to be between 1 and 2 months of age, were documented via a spotting scope and long-range telephoto lens (Mildenstein 2024).

Fanihi have been observed both historically and recently foraging within the North Ramp construction footprint. Between August and September 2021, during surveys for the EIS, more than 25 incidental observations of fanihi sign, including bat droppings and scent, were detected within the North Ramp construction footprint (Figure 10).

These incidental observations of bat sign were often detected on *Aglaia mariannensis* and *Premna serratifolia*, with neighboring *Ficus prolixa* trees, indicating a possible food source for the bats foraging within the construction footprint. In September 2021, during surveys for the EIS, a bat protocol survey recorded a total of 10 bat sightings from fruit bat survey stations around the North Ramp construction. The MSA-1 construction footprint was excluded from the 2021 protocol surveys done in support of the EIS due to unavailable escorts during dawn and dusk hours; however, the MSA-1 area is assumed to have bats based on historical observations within the general area (University of Guam 2024).



Annual base-wide bat surveys have had intermittent observations of bats within the proposed forest enhancement area prior to 2015; however, no bats were recorded during annual surveys since 2015 (University of Guam 2024). During 2023 base-wide surveys, two bat observations were recorded from the top of the cliff above the forest enhancement area (University of Guam 2024). Regular surveys of the proposed forest enhancement area do not occur. Surveys in 2024 of the proposed forest enhancement area noted that tree species known to be food sources for bats were present.”

The BA Map Books (p. 14) provides a vegetation map of the proposed forest enhancement area, shown below (Figure 11). The status of fanihi at the Tarague forest enhancement area is characterized in the following way in the BA's Supplemental Biological Survey Report (p. 8):

“The proposed forest enhancement area is predominantly coconut forest, with mixed limestone forest-toe slope along the cliff line, which is very dense because of the relatively open canopy that allows light to penetrate to the ground level. The coconut forest includes remnants of several copra plantations (Liston 1996) and consists largely of coconut trees (*Cocos nucifera*). Some common plants in the coconut and mixed limestone forest include (but are not limited to) *Meiogyne cylindrocarpa*, *Elaeocarpus joga*, *Tristiropsis acutangula*, *Ochrosia oppositifolia*, *Aglaia mariannensis*, *Macaranga thompsonii*, *Pisonia grandis*, *Eugenia thompsonii*, and *Cycas micronesica* (DON 2019). Non-native species that would be expected to move through this area include Philippine deer and feral pigs. There have been incidental sightings and signs of fanini using this area in past years (University of Guam 2023).”

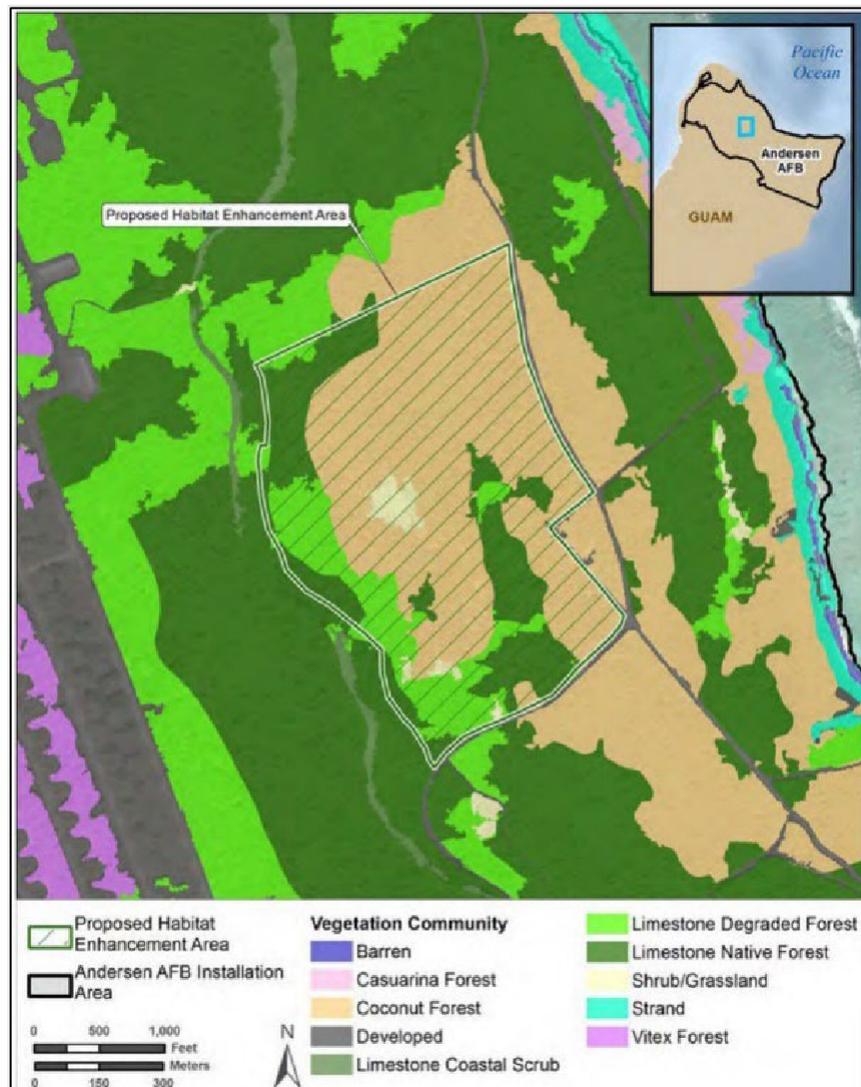


Figure 11. Forest enhancement area vegetation.

Status of *Cycas micronesica*

Species Description

Cycas micronesica was listed as threatened on October 1, 2015 (80 FR 59424). No critical habitat has been designated for the species.

Cycas micronesica is a palm-like tree, usually unbranched with a thick trunk. Adult stems range from 26 to 39 ft (8 to 12 m) in length and 5 to 10 in (13 to 25 cm) in diameter. The leaves, 3 to 6.5 ft (1 to 2 m) long, are glossy, pinnate, and restricted to the top of the trunk (Stone 1970, p. 65; Raulerson and Rinehart 1991, p. 4; Hill 1994, p. 556).

The species *Cycas micronesica* (formerly *Cycas circinalis*) is part of the Cycadaceae family, which contains only one genus, *Cycas*, a very ancient genus of trees dating back to the Jurassic period. *Cycas micronesica* is known from Guam, Rota, and Tinian (the Tinian population being outplanted) in the Mariana Islands, Yap in the Federated States of Micronesia, and the Republic of Palau.

Life History

Cycas micronesica is the only native gymnosperm in the Mariana Islands. *Cycas micronesica* occurs in limestone forests in Guam and Rota, with fewer occurrences in volcanic soils typical of southern Guam (Stone 1970, p. 65; Hill 1994, p. 556). *Cycas micronesica* is also observed in coastal strands (Harrington et al. 2012, p. 14). The fruit of *Cycas micronesica* has been identified as a food source for the fanihi (*Pteropus mariannus mariannus*) (Wiles and Fujita 1992, p. 27), as well as for the CHamoru, who, after first processing to rid the naturally occurring toxins, use them to make flour (Whiting 1963, pp. 276–277).

Cycads are dioecious, and both sexes bear reproductive structures that are relatively massive amongst gymnosperms. Male plants produce microspores; female plants produce megaspores within leaf-like megasporophylls. The average age at sexual maturity of naturally occurring *Cycas micronesica* plants has not been documented, however, reproductive parts appeared after three years on trees propagated in a nursery (GPEPP 2021, p. 40). Male trees bear an elongated, upright cone in the center of the leaves, with the woolly scales of the cone producing pollen. When the pollen is mature the cone is very strongly scented. The female trees also produce a central cone-like structure that opens outward to reveal individual soft, woolly, tan leaves that are deeply lobed and toothed and bear ovules in notches along the margins. If the ovules are fertilized by pollen, glossy, large, hard-shelled brown seeds develop on the leaves (Raulerson and Rinehart 1991, p. 4). Many plants reach the pollination phase between April and early August (Hamada et al. 2015, p. 527). *Cycas micronesica* emits chemical cues to attract specialist insects for pollination, primarily of the genus *Anatrachyntis* (Lepidoptera: Cosmopterigidae) (Schneider et al. 2002, p. 282; Terry et al. 2009, p. 95), but there is also evidence of wind as a pollen vector in Guam in open or forested areas (Terry et al. 2009, p. 96; Hamada et al. 2015, entire).

Cycas micronesica can also reproduce vegetatively, so in addition to sexual reproduction via seeds, they reproduce and can be propagated by basal suckers, vegetative offsets (i.e., bulbils, cycad pups), and cuttings. Cibrian-Jaramillo et al. (2010, pp. 2373–2374) suggested *Cycas*

micronesica seeds may disperse by floating on rivers and streams. Cycads pups, which may or may not have natural root growth while on the parent tree, may be salvaged and propagated (DON 2019, p. 12). Concave spots on young plants between 12 and 18 months old can be cut out and planted, similar to the eyes on potatoes (Raulerson and Rinehart 1991, p. 4).

The species is considered long-lived, and plants may live up to 40 years (Marler et al. 2010).

Population Dynamics

Populations of *Cycas micronesica* were known historically from Guam, Rota, Yap, and Palau (Hill 2004, p. 556; Hill et al. 2004, p. 280) and the species has been outplanted on Tinian (NAVFAC Marianas 2016, p. 18). In a 2002 forest inventory on Guam, prior to the unintentional introduction of the devastating Cycad aulacaspis scale (*Aulacaspis yasumatsui*), *Cycas micronesica* was the most abundant tree detected, with over 1.5 million individuals counted on island (Donnegan et al. 2004, p. 16). In 2009, sampling at 24 locations across Guam identified 18 genetic populations by analyzing genetic connectivity throughout the island (Cibrian-Jaramillo et al. 2010, pp. 2373–2375). Populations were found in both volcanic and calcareous coralline soils. The Ritidian population was the most geographically isolated in the north, with almost no immigrants from nearby populations, while the most genetically diverse were found in the south, in Talofofu and Nasa. In another survey, an unquantified number of *Cycas micronesica* individuals were found at 11 sites across Guam, some of which were on Andersen Air Force Base (Harrington et al. 2012, entire).

In 2013, over 257,000 individuals were documented on Andersen Air Force Base, but in a population, structure dominated by adults with little recruitment and declining reproductive success (Marler 2014, entire). Between March 2015 and January 2017, natural resources personnel from Marine Corps Activity Guam (now Marine Corps Base Camp Blaz) conducted surveys in Guam which identified 19,852 mature *Cycas micronesica* (DON 2017, p. 82).

At the time of listing in 2015, there were fewer than 516,000 individuals on Guam (80 FR 59424, October 1, 2015, p. 59434). This number did not distinguish between successfully reproducing adults and juveniles, and due to the effects of cycad aulacaspis, it is likely that the number of extant individuals that could successfully reproduce was much lower. The population estimate for Rota was 111,500 individuals; outside of the Marianas, approximately 300,000 were estimated on Yap, and 2,500 on Palau (80 FR 59424, October 1, 2015, p. 59434).

The spatial distribution of the species has become more isolated in time and less continuous as habitat loss and fragmentation have acted as barriers to seed and pollen dispersal. In 2015, there were an estimated 15 to 20 populations across Guam, Rota, Yap, and Palau with no more than four populations on any one island or island group (80 FR 59424, October 1, 2015, p. 59435). By spatially comparing populations based on the most recent genetic study (Cibrian-Jaramillo et al. 2010, entire) and targeted surveys, we now assume there are approximately 21 distinct populations of *Cycas micronesica* spread throughout forested areas of Guam. Recent surveys outside of Guam have not been extensive, and the number of known populations for Rota, Palau, and Yap have not been revised since the time of listing. *Cycas circinalis* has been identified on Pagan (Pratt 2011, p. 54) and is likely to be *Cycas micronesica*. However, this has not been verified.

Status and Distribution

In 2002, the Forest Inventory and Analysis Program estimated the Guam island-wide cycad population using 46 permanent field plots serving as a baseline. In 2012, cycad populations were re-monitored to detect change since 2002. In the 10 years between field studies, the population estimate decreased from 1,571,556 to 624,000 individuals (range including sampling error: 382,000-866,000) (Donnegan et al. 2004 p. 16; Lazaro et al. 2013, p. 7). This represents an average annual rate of decline of 8.1% (5.8%-13.2%) (Figure 12).

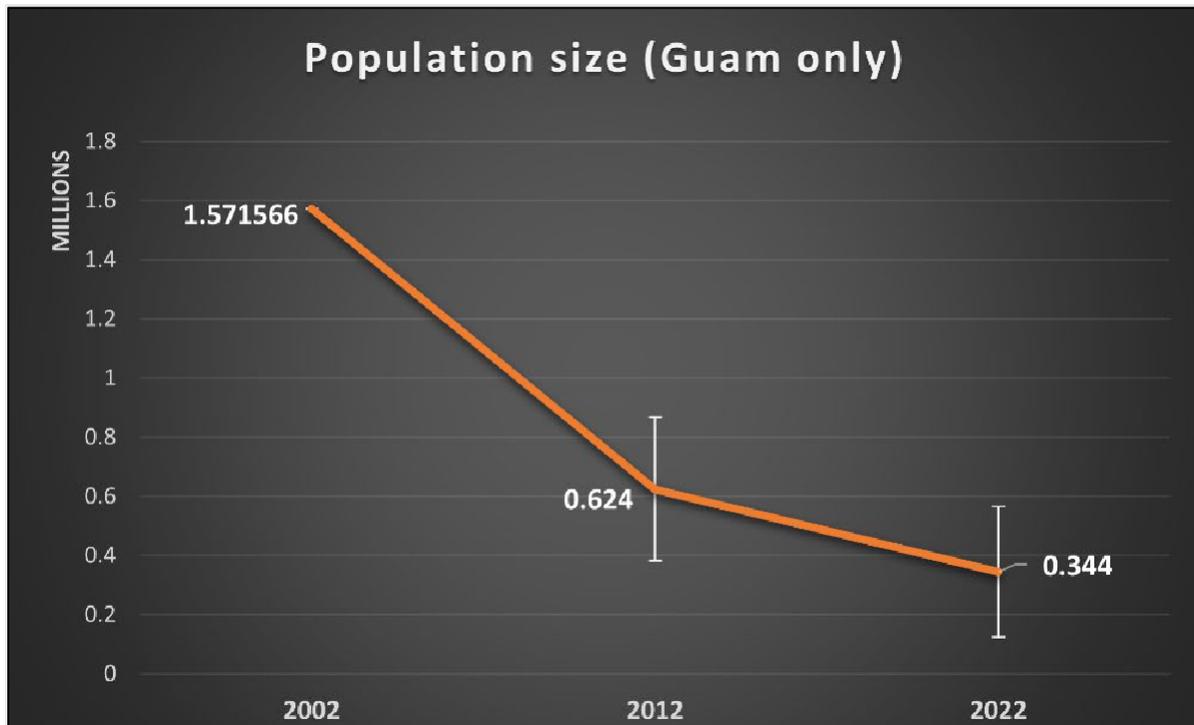


Figure 12. *Cycas micronesica* population decline on Guam (estimated from Donnegan et al. 2004; Lazaro et al. 2013).

The 2020 population estimates signify a total decline of 33.3 percent on Guam and 53.4 percent on Rota since 2013, primarily the result of cycad aulacaspis and loss of habitat through development. We estimate a total of 32 populations of *Cycas micronesica*—approximately 396,133 individuals in the wild in the Mariana Islands and fewer than 290,950 individuals in Yap and Palau—for a total of no more than 687,083 individuals across the range of the species (USFWS 2020b, p. 13). The population estimates for Palau and Yap made at the time of listing remain the most recent (80 FR 59424, October 1, 2015, p. 59434). The latest projections include the possible complete extirpation of *C. micronesica* from Guam by 2032 if the current rate of mortality continues unabated (Marler and Krishnapillai 2020, p. 7). Applying the 8.1% average annual rate of decline, we calculated only 344,000 individuals (between 123,000 to 538,000) remained on Guam in 11 populations in 2022 and as few as 52,133 individuals may persist in four populations on Rota (USFWS 2023a, p. 3). Our further application of the 8.1 percent annual decline rate indicates there may be as few as 290,529 *C. micronesica* remaining on Guam today. Overall, these estimates indicate the range-wide population may have further declined 30 percent since 2020.

In February 2016, the total outplanted experimental population of *Cycas micronesica* on Tinian was 903, half of which was small and required continued maintenance (NAVFAC Marianas 2016, p. 11). Cycad aulacaspis scale and another introduced pest, cycad blue butterfly (*Chilades pandava*), were detected in August 2019, and cycad aulacaspis had spread to half of the plots by April 2021 (NAVFAC Marianas 2021a, p. 18). Ongoing maintenance of the outplanted plants includes systematic pesticide application and vegetation management, although the highest mortality is being observed in plots with little cycad aulacaspis infestation. As of April 2021, there were approximately 850 live cycads in the Tinian plots (NAVFAC Marianas 2021, p. 18).

Threats

The following threats to *Cycas micronesica* contributed to its listing or were identified after listing and continue to impact the ability of the species to recover.

Disease and pests: Cycad aulacaspis scale, a cycad specialist insect scale, is the most significant threat to the recovery of *Cycas micronesica* and the primary driver of mortality at all life stages, limiting reproduction and recruitment of individuals into the population (Marler and Muniappan 2006, p. 3; Marler 2014, p. 1; Marler and Krishnapillai 2020, entire). *C. micronesica* mortality from cycad aulacaspis reached 92 percent in Guam by 2012 (Marler and Lawrence 2012, p. 1). Marler and Terry (2023, p. 374) find evidence of a recent rebound of reproductive effort in Guam's *C. micronesica*.

"During the years immediately after the invasion, the volume of the male cones declined to 24% of the pre-invasion volume, with some increase in volume during subsequent years. However, as of 2021, the male cone volume remained stunted at 57% of the preinvasion size."

"A recovery in the seed set occurred from 2008 to 2014, and the highest percentage seed set years, 2011–2014 (23–24%), were not significantly different from the years 2001–2003 (26%–28%) (logistic regression, invasion variable, $p = 0.23$). Afterwards, the seed set began to decline again and in recent years has remained at 10%–14%, significantly different from the pre-invasion years (logistic regression, invasion variable, $p < 0.001$).

"These seedless sporophylls accounted for about 20% of all the sporophylls through 2019. The past three years have shown signs that the production of these seedless sporophyll is returning to pre-invasion percentages (logistic regression, invasion variable, $p = 0.049$)."

"Megasporephylls that are not isobilateral may also be found in some megastrobili, and prior to the invasion 9.4% of the sporophylls fell into this category (Figure 4c). Following the invasion, this metric increased by 69% (2006–2007 versus the pre-invasion years, logistic regression, invasion variable, $p < 0.001$), but began to decline again by 2008. About 15% to 20% of the sporophylls exhibited this behavior through 2018. The percentage of megasporephylls that were not isobilateral during the final three years of this study was not different from that during the pre-invasion years (logistic regression, invasion variable, $p = 0.332$)."

Other invertebrates, such as the leaf miner *Erechthias* species, the cycad blue butterfly, and the native longhorn beetle, *Dihammus marianarum*, also contribute to declining health and mortality of individuals in Mariana Islands cycad populations (Marler 2013, entire).

Loss or degradation of habitat: The conversion of land for agriculture and urban development continues to reduce and degrade the amount of habitat available for *Cycas micronesica* in the Mariana Islands; 21 percent of Guam and 6 percent of Rota is now developed land unsuitable for the species (Spies et al. 2019, p. 6). Ongoing military expansion and training is also reducing the availability or suitability of habitat for *Cycas micronesica*. The establishment of Marine Corps Base Camp Blaz was expected to result in the loss of approximately 1,219 ac (493 ha) of limestone forest and 613 ac (248 ha) of herbaceous scrub in Guam (USFWS 2017, p. 17); actual vegetation removal may be approximately 200 acres less than expected (Cobb pers. comm. 2025). A large population of *Cycas micronesica* was found on Andersen Air Force Base where a live fire training range complex is under construction as part of the Marine Corps relocation. Live fire may cause damage to individuals within and outside of the training range, and ordnance poses a wildfire risk in the area (80 FR 59424, October 1, 2015, p. 59469).

Non-native plants: Invasive plants compete with *Cycas micronesica* for space and convert native plant communities to non-native dominated communities, degrading native habitats through a variety of processes that modify light availability, soil-water regimes, nutrient cycling, and fire regimes (80 FR 59424, October 1, 2015, p. 59456).

Invasive animals: Non-native ungulates trample vegetation, cause erosion, graze to the point of clearing understory vegetation, and prevent regeneration by eating seeds and seedlings. The species most impacting *Cycas micronesica* by herbivory are feral pigs (*Sus scrofa*) and Philippine deer (*Cervus mariannus*) (USFWS 2023a, p. 11). Plant regeneration is also impacted by rats, which eat most plant parts (80 FR 59424, October 1, 2015, p. 59455). The introduction of the brown treesnake (*Boiga irregularis*) to Guam caused the loss or severe reduction of most native bird species that dispersed seeds or pollinated native plants (80 FR 59424, October 1, 2015, p. 59456) and has had a cascading effect on the health of the cycad's forest habitat. Biocontrol or other methods of targeting introduced pests, especially cycad aulacaspis, have been, and must continue to be attempted to stabilize the population (Marler et al 2024, p. 26153), and future invasions from other pests must be prevented (Marler and Lawrence 2012, p. 240). Because physical damage and herbivory from feral pigs and deer compound the effects of insect pests (Marler and Lawrence 2012, p. 238), ungulate control and fencing restoration sites are also crucial steps in managing *Cycas micronesica* populations.

Low population numbers: A lack of recruitment into the *Cycas micronesica* populations in Guam that are currently dominated by adults increases the vulnerability of the species and challenges its ability to maintain or expand a viable population structure (Cibrian-Jaramillo et al. 2010, p. 2373; Marler and Lawrence 2012, p. 237).

Fire: Fires threaten native species and ecosystems of the Mariana Islands, particularly in Guam, and are both intentionally set, e.g., arson, or caused by altered fire regimes due to alien species (80 FR 59424, October 1, 2015, p. 59457). Wildfires burn an annual average of 1.6 to 2.4 percent of the land area in the Northern Mariana Islands and 2.8 to 4.0 percent of land area of Guam (Minton 2006, p. 23; Dendy 2019 in litt., Trauernicht and Kunz 2019, p. 1; FSRD 2022, p. 3). In

2021, a total of 177 wildfires burned approximately 3,624 ac (1,467 ha) of land in Guam (FSRD 2022, p. 3).

Stochastic events: The Mariana Islands lie in the world's most prolific typhoon basin. Unhealthy trees are less able to withstand or recover from damage caused by the high winds and rains of typhoons (Hirsh and Marler 2002, pp. 600–602) particularly if the tree's natural resilience has been impaired by chronic cycad aulacaspis scale. Further, the damage or destruction of vegetation from typhoons modifies light availability and creates space for invasion by non-native pest and plant species that compete for space, water, and nutrients, and alter basic water and nutrient cycling processes (80 FR 59424, October 1, 2015, p. 59458). While the impacts of such stressors on *Cycas micronesica* are not well understood, anticipated weather regime changes are likely to be one of the direct impacts to *Cycas micronesica* and could also exacerbate the effects of other threats (80 FR 59424, October 1, 2015, p. 59458).

Recovery criteria include securing 10 populations with a minimum of 400 mature individuals per population that are stable, secure, and naturally reproducing for a minimum of 10 years. Threats to the species and its habitat are managed and a species' management and monitoring plan identifies actions necessary to control threats to the long-term persistence of habitat supporting these (i.e., invasive animals including ungulates, invasive plants including grass invasion due to wildfire) populations. Species-specific management actions may be necessary to ensure stable populations even after species are downlisted (USFWS 2023b pp 38-39).

Environmental Baseline – *Cycas micronesica*

The BA's Supplemental Biological Survey Report (pp 17-22) details the status of the *Cycas micronesica* in the project footprint as follows:

“Historically, *Cycas micronesica* have been found in limestone forests throughout Andersen AFB. Surveys conducted for this project in 2021 identified a total of 587 individuals within the entire survey area for North Ramp and MSA-1, with 416 of those within the project area footprint that was planned for vegetation removal.

There were 1,689 *Cycas micronesica* in total recorded during the 2024 surveys. Of those, 222 are within the project area (construction footprint) of the North Ramp and MSA-1 that is proposed for vegetation clearing. No new individuals were recorded within the previously surveyed project footprints between the 2021 and 2024 surveys.

Cycas micronesica in the North Ramp and MSA-1 were observed to have been directly impacted by strong winds of Typhoon Mawar. Signs of damage were common on each tree throughout the project area. Surveyors estimated that in the North Ramp, approximately 5 to 10 percent of the individuals observed were downed and an additional 5 to 10 percent had lost their apical stem. In the cases of downed trees, regenerative growth was observed from the stem tissue on the ground and in cases of apical stem loss, frequent growth of pups was observed. Evidence of cycad *Aulacaspis* scale was noted on approximately more than half of individuals. Each tree surveyed in the North Ramp was assigned a health rating. In general, those trees that are in fair or good health are considered candidates for salvage and transplant.

- Good -- Tree has a full set of healthy erect leaves in the absence of old dead leaves; evidence of cycad scale is minor; no evidence of rot, termites, or other pests.
- Fair -- Tree has moderate presence of cycad scale and shows signs of stress in terms of yellowing and drooping leaves; new set of leaves may be present; low to moderate evidence of rot, termites, or other pest and defects (should be such that they do not pose a serious risk to the tree survivorship).
- Poor -- Tree has few living leaves; moderate to severe cycad scale infestation; and/or the evidence of rot, termites, or other pests and defects indicate a low probability of the tree surviving if salvaged.

Table 6 summarizes the status of *Cycas micronesica* observed during the 2024 field surveys in the North Ramp and provides a comparison of the health assessment for the *Cycas micronesica* recorded in the North Ramp survey area in 2021. Overall, there was no notable change to the health of the *Cycas micronesica* population in the North Ramp approximately seven months following Typhoon Mawar. Damaged trees are showing signs of crown regeneration and pup growth. Long-term effects due to changes in microclimates from extensive defoliation and the continued impact of cycad *Aulacaspis* scale are expected but are not yet evident.”

Table 6. *Cycas micronesica* Health Summary from 2024 North Ramp Surveys.

Health Rating	Number in Survey Area	% of Total in 2024	% of Total in 2021
Good	46	25%	26%
Fair	130	70%	61%
Poor	9	5%	13%
Total	185	100%	100%

In the interval between the 2021 and 2024 North Ramp and MSA-1 project footprints *Cycas* surveys, the number of live *C. micronesica* declined from 416 to 222 (BA’s Supplemental Biological Survey Report p. 17). This constitutes a 47% population reduction with an average annual decline of 18.9%. This decline is much faster than previous data had indicated, and it is a stark indication of the species vulnerability. The number of *C. micronesica* expected to remain in these project footprints in the absence of the proposed action, is expected to dwindle due to increased mortality due in large part to the cycad *Aulacaspis* scale and because ungulates prevent seedling recruitment. There is uncertainty regarding the decline rate. Annual decline is likely to be between 5.8% and 18.9%. Application of this range of annual rates of decline to the *C. micronesica* plants remaining within the project footprints are shown in Table 7. Application of the optimistic 5.8% decline rate indicates there may be as many as 67 *C. micronesica* remaining in the North Ramp and MSA-1 project footprints in 2043 if the action were not conducted. If the annual decline of 8.1% occurs, 42 live plants would remain in these sites in 2043. Should the 18.9% annual rate of decline continue, three live *C. micronesica* would remain in these project footprints, absent the proposed action.

Table 7. Recent and Future Expected Decline of Live *Cycas micronesica* in the North Ramp and MSA-1 Project Footprints.

YEAR		5.8% Future Decline: Baseline - Actual (surveyed) and projected future number of Cycads expected to persist in the proposed development area in the absence of the proposed action, based on the 5.8% annual decline rate at the optimistic low end of our confidence interval	For Comparison: 8.1% Future Decline: Baseline - Actual (surveyed) and projected future number of Cycads expected to persist in the proposed development area in the absence of the proposed action based on an 8.1% annual rate of decline.	For Comparison: 18.9% Future Decline: Baseline - Actual (surveyed) and projected future number of Cycads expected to persist in the proposed development area in the absence of the proposed action based on a continued 18.9% annual rate of decline.
2021 Site Surveys	2021	416	416	416
	2022	(Note, between 2021 and 2024 surveys, project footprint Cycas numbers dropped 47%, an annual average rate of 18.9%)		
	2023			
2024 Site Surveys	2024	222	222	222
Year 1 Land Clearing	2025	209	204	180
	2026	197	187	146
	2027	186	172	118
	2028	175	158	96
Year 5	2029	165	146	78
	2030	155	134	63
	2031	146	123	51
	2032	138	113	42
Year 10	2033	130	104	34
	2034	122	95	27
	2035	115	88	22
	2036	108	81	18
Year 15	2037	102	74	15
	2038	96	68	12
	2039	91	63	10
	2040	85	57	8
Year 20	2041	80	53	6
	2042	76	49	5
	2043	71	45	4
	2044	67	42	3

Based on project reporting for the Relay Ground Station – Asia project (Gutierrez 2024, p. 1, Bruns 2024, p. 1, and Gutierrez 2024b, p. 1), of 57 *Cycas micronesica* remaining alive within that project’s construction footprint, 42 (73.6%) were healthy enough for salvage of vegetative propagules or seeds.

The BA’s Supplemental Survey Report (pp. 17-22) provides the following details about the *Cycas micronesica*, in the Forest Enhancement Area at Tarague (Figure 13):

“Since the forest enhancement area is proposed for transplant of the plants that would be salvaged from the North Ramp and MSA-1 construction footprints, this area was surveyed in 2024 to confirm that *Cycas micronesica* are present and suitable microclimates are available. There were 1,219 *Cycas micronesica* recorded within the 151-ac (61-ha) forest enhancement area, or approximately eight individuals per acre. The number of trees that occur in those 151-ac (61 ha) is expected to be higher, since the 2024 survey was intended to confirm presence and assess general health and was not a complete inventory.

The health of a subset of the *Cycas micronesica* in the forest enhancement area was recorded during January and February 2024. The health of all *Cycas micronesica* was not recorded to expedite surveys, but anecdotal evidence from surveyors noted a higher number of healthy *Cycas micronesica* than other areas of Andersen AFB and less frequent occurrence of cycad *Aulacaspis* scale. Trees were also frequently observed to have multiple pups. The health assessment results from a subset of *Cycas micronesica* in the habitat assessment area is shown in Table 8 and supports the surveyor observations.”

Table 8. *Cycas micronesica* Health Summary from 2024 Surveys of Forest Enhancement Area at Tarague.

Health Rating	(Subset) Number in Survey Area	% of (Subset) Total in 2024
Good	86	36%
Fair	142	60%
Poor	10	4%
Total (Subset)	238	100%

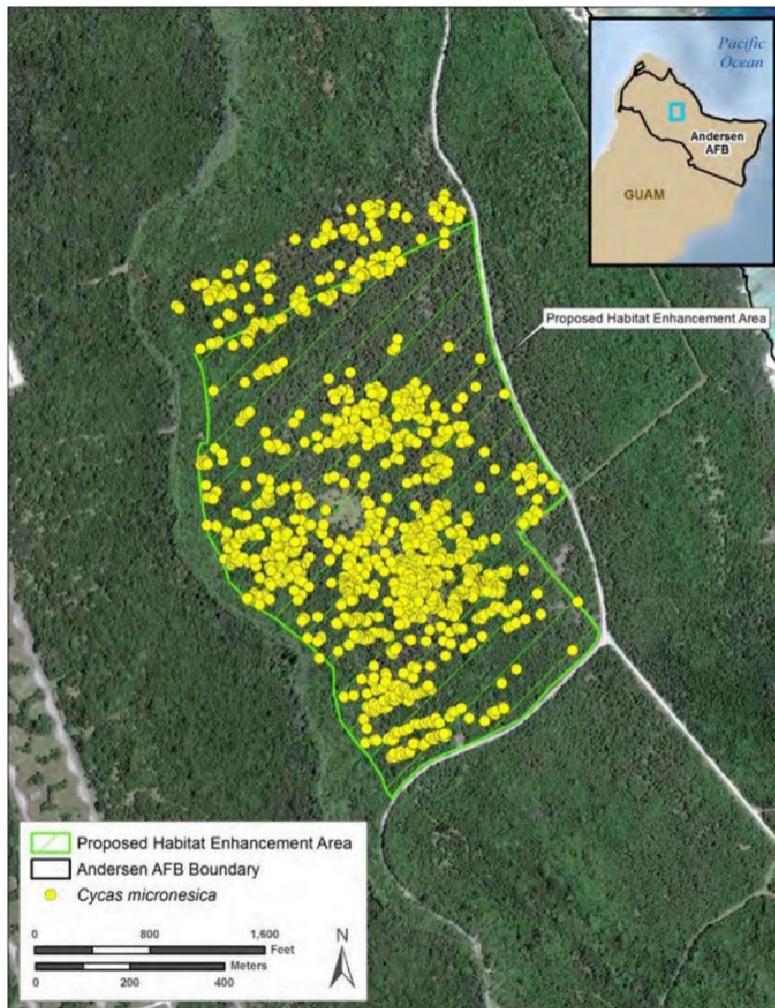


Figure 13. The 1,219 *Cycas micronesica* at the proposed Tarague forest enhancement area.

Status of *Tabernaemontana rotensis*

Species Description

Tabernaemontana rotensis is a medium-sized (26 to 33 ft (8 to 10 m) tall), long-lived perennial tree in the Apocynaceae (dogbane) family endemic to the islands of Guam and Rota (Stone 1970, p. 485). Its leaves are thin, light green, opposite (a pair of leaves at each node, opposite each other), elliptic to oblong in shape, 6 to 12 in (15 to 30 cm) long, 2 to 4 in (5 to 10 cm) wide and contain a copious milky sap. Its flowers are white, elongate, slender, and branch from the tree (Stone 1970, p. 485; UOG 2007, p. 6; GPEPP 2015, Appendix 2).

Life History

A long-lived perennial tree, *Tabernaemontana rotensis* occurs in limestone forests and is most often found co-occurring with other native plants (UOG 2007, p. 11). The species can colonize sites with a range of light conditions from full sun to deep shade and has primarily been found in areas of little to no slope, i.e., with less than a 15 percent gradient (UOG 2007, p. 10; JRM and UOG 2016, p. 5).

While the average age of sexual maturity of naturally occurring *Tabernaemontana rotensis* plants has not been documented, propagated nursery plants were seen flowering after one year for trees reaching a height of 4 ft (1.2 m) (GPEPP 2019, in litt., p. 3). *Tabernaemontana rotensis* populations typically flower from August through October, during which 40 to 80 percent of trees are found to have at least some flowering occurring every month (UOG 2007, p. 23). Germination and seedling emergence have been shown to be maximized in full sun conditions, such as after typhoon damage. About one month after a typhoon the species develops a synchronized pulse of flowering which leads to a mass seeding event approximately four months post-typhoon (UOG 2007, p. 21).

Following flowering, *Tabernaemontana rotensis* trees produce conspicuous beaked orange fruits that are either single or twinned. The fruits reach full size around 1 in (3 cm) long, 30 to 35 days after flowering. Fruit is mature at around 90 days, when it turns from green to orange, splits open, and exposes the seeds (UOG 2007, p. 6, 24).

There is little data on the pollinators of *Tabernaemontana rotensis*, although seed dispersal of the species is thought to be dependent on birds. The eradication of most pollinators and frugivorous bird species in Guam by invasive species has restricted the spatial distribution of *Tabernaemontana rotensis* so that the trees are generally found clumped in confined areas, with seedling establishment limited to fruit that falls in the vicinity of the parent tree. As a result, seedlings develop in extreme competition with each other, and many become stunted and die (UOG 2007, p. 14).

Population Dynamics

The species *Tabernaemontana rotensis* is known historically from Guam and Rota. At the time of listing in 2015, the population was estimated to be comprised of seven naturally occurring populations comprised of more than 21,000 seedlings, immature trees, and reproductive, mature

trees on Guam, and nine trees on Rota (80 FR 59424, October 1, 2015, p. 59438). Most of the *Tabernaemontana rotensis* on Guam were found in clustered populations on Andersen Air Force Base with an average of 80, but up to 850, individuals per site (UOG 2007, p. 9). Thirty *Tabernaemontana rotensis* trees had also been outplanted on Rota (80 FR 59424, October 1, 2015, p. 59438). Surveys on Guam have continued to document mature trees and seedlings throughout military lands, as well as in the Anao Conservation Area, Ipan, and the Guam National Wildlife Refuge, Ritidian Unit (USFWS 2023c, p. 9–10).

Status and Distribution

As of 2023 (USFWS 2023c, p. 19), we estimate there are 16,000 individuals of *Tabernaemontana rotensis*, with ten population units in Guam, and five population units on Rota spread out across the island. Our 2020 population estimate was 15,341 naturally occurring individuals across eight sites in Guam and six sites in Rota. Individuals on Rota are spread out across the island (USFWS 2020c, p. 1-15). While reproducing individuals are frequently observed in *Tabernaemontana rotensis*, the lack of adequate seed dispersal has reduced recruitment of mature individuals into the population in Guam.

Species-Specific Threats

Invasive plants compete with *Tabernaemontana rotensis* for space and convert native plant communities to non-native dominated communities, degrading limestone forests through a variety of processes that modify light availability, soil-water and fire regimes, and nutrient cycling (80 FR 59424, October 1, 2015, p. 59456). *Tabernaemontana rotensis* is rarely found co-occurring with non-native species (UOG 2007, p. 11).

Environmental Baseline – *Tabernaemontana rotensis*

In 2021 project site surveys, 99 *Tabernaemontana rotensis* were found in the project construction footprint and recruitment of *T. rotensis* was observed: 27 of the plants (27%) being smaller than a quarter or having only one root and therefore not suitable for salvage (BA p. 48).

The BA's Supplemental Biological Survey Report (p. 23) provides the following updated survey data for the project sites:

“During the 2024 surveys, there were 103 individuals recorded within the North Ramp survey area, however, not all points collected in 2021 were revisited. No seedlings were observed, but flowering and fruiting was noted on several trees which indicates that recruitment may occur prior to vegetation clearing within the construction footprint.

Since the forest enhancement area is proposed for transplant of the plants that would be salvaged from the North Ramp construction footprints, this area was surveyed in 2024 to confirm that *Tabernaemontana rotensis* are present. There were 71 individuals recorded within the 151-ac (61-ha) forest enhancement area. All of the individuals were clustered in three points within the limestone degraded forest habitat in the forest enhancement area. The number of trees that occur in those 151-ac (61 ha) may be higher, since the

2024 survey was intended to confirm presence and assess general health and was not a complete inventory.”

Status of *Bulbophyllum guamense*

Species Description: USFWS 2023d (p.9) provides the following description of the species:

“*Bulbophyllum guamense* is an epiphytic orchid (family Orchidaceae) characterized by leaf-bearing pseudobulbs that are spaced or clustered on a creeping or mat-like formation of fiber-covered rhizomes or “stems” (Raulerson and Rinehart, 1992, p. 89). A pseudobulb is an enlarged stem that holds water and nutrients commonly found in tropical epiphytic orchids. The pear-shaped pseudobulb measures approximately 1-in (2.5-cm) long. They are smooth in the rainy season and become ribbed during the dry season (Raulerson and Rinehart 1992, p. 90). Leaves are oblong, elliptical, and 4 to 6 in long (10 to 15 cm) and 1 to 1.5 in wide (2.6 to 3.8 cm), emerging at the top of the pseudobulb. Leaf morphology has noticeable variation. The inflorescence originates at the base of a pseudobulb and extends beyond the length of the leaves producing a single, fleshy, greenish-yellow flower 0.4 in (1.5 cm) long and 0.2 in (0.5 cm) broad at its base. The pseudobulb will continue to produce flowers, one at a time, until one is pollinated (Raulerson and Rinehart 1992, p. 90). The flower produces an unpleasant carrion-like (decaying flesh) scent (Raulerson and Rinehart 1992, p. 90) that is suggestive of a pollination syndrome that includes certain species of flies (Tan 2006, p. 195). The fruit is a small, ribbed capsule (0.4 in (1 cm) wide and 2 in (5 cm) long that produces tiny feather-like seeds that can easily be dispersed by wind (McConnell 2019, pers. comm.). Once a pseudobulb produces fruit, it shoots off a rhizome laterally (i.e., sympodial growth) that forms another pseudobulb, which then repeats the life cycle. Many orchids, including numerous species within the genus *Bulbophyllum*, require the presence of a microbial partner, e.g., mycorrhizal fungi, for seed germination. Flowering occurs almost year-round.

Bulbophyllum guamense is endemic to the forest habitat on the islands of Rota and Guam. Guam and Rota are the most southern islands in the Mariana Archipelago. *Bulbophyllum guamense* primarily grows on native trees and tall shrubs in native limestone forest and mixed introduced forest subtypes (Willsey et al. 2019, p. 4; Zarones et al. 2015, in litt.). However, *B. guamense* has also been observed growing on nonnative trees and tall shrubs in the mixed introduced forest subtype sometimes with a greater number of orchids (e.g., *Areca catechu* or betel nut) (Willsey et al. 2019, p. 4; Zarones et al. 2015, in litt.). Occasionally *B. guamense* has been observed growing on unidentified dead trees (Zarones et al. 2015, in litt.). Native host tree species include *Hernandia labyrinthica*, *Elaeocarpus joga*, and *Pisonia umbellifera* (Zarones et al. 2015, in litt.). Other host tree species include the breadfruit genus *Artocarpus* sp. (*A. mariannensis* is native but there are also several naturalized species) (Stone 1970, p. 158) and *Persea americana* (Zarones et al. 2015, in litt.). For more information regarding the structure and composition of the forest habitat on Guam and Rota, please see Willsey et al. (2019, entire).”

Status and Distribution: Nine populations of *Bulbophyllum guamense* have been identified on Guam and four populations are known to occur on Rota (USFWS 2023d p. 31). Five *B. guamense* were recently found at the HMU (NAVFAC, Marines 2023b, p. 15), and an estimated 201 plants occur the Northwest Field population. In total, there are an estimated 10,767 *B. guamense* on Guam.

As referenced in USFWS 2023d (p. 27):

“*Bulbophyllum guamense* is an epiphytic orchid found in tall trees and shrubs primarily within the native and mixed/secondary subtypes of forest habitat on the islands of Guam and Rota. In Guam, small populations of *Bulbophyllum guamense* primarily occur at relatively high elevations in the native limestone and mixed/secondary forest habitat. On northern Guam, small populations of *B. guamense* occur on remnant native limestone forest patches interwoven with developed lands. On southern Guam, small populations of *B. guamense* occur on the mountainous slopes within native limestone forest habitat (e.g. Mt. Lamlam and Mt. Almagosa) as well as in ravine mixed/secondary forest on the mountainous slopes within native volcanic forest habitat (i.e., Mt. Bolanos) (Harrington et al. 2012, in litt.; USFWS 2012, in litt.; USFWS 2015b, p. 59434; NBG and Sundance-EA Associates 2019, in litt.; UOG 2019, in litt.; NBG and Sundance-EA Associates 2019, in litt.). There are also likely small populations and/or remnant individuals scattered along the tall, steep forested seaside cliffs surrounding Guam (e.g., Haputo Ecological Reserve and the adjacent NBGTS) (Harrington et al. 2012, in litt.; USFWS 2012, in litt.; USFWS 2015b, p. 59434; Schils et al. 2017, p. 232; UOG 2019, in litt.). On Rota, several smaller populations of *B. guamense* occur along the slopes of the Rota Sabana, primarily above 980 ft (300 m) elevation (Zarones et al. 2015, in litt.).”

Life History: As referenced in USFWS 2023d (pp 16-17):

“There are no detailed studies regarding the life history needs of *Bulbophyllum guamense*. Similarly, there is very little known regarding the population structure of *B. guamense*, nor how individuals and populations react to changes in the environment, whether positive or negative impacts. The individual needs of *B. guamense* are based on what is currently known about the species, similar species in the genus *Bulbophyllum*, and epiphytic orchids in general.

Individuals likely require habitat characteristics, such as rainfall, temperature, and associated species, of native forests on Guam and Rota to grow and reproduce. Additionally, seedlings of *B. guamense* likely require the presence of one or more species of microbes to successfully germinate and grow to adult plants. Many epiphytic and terrestrial orchids have been shown to require the presence of mycorrhizal fungi for seed germination (Alghamdi 2019, p. 495), and sometimes bacteria, often referred to as plant growth-promoting rhizobacteria (Tsavkelova et al. 2007, p. 655). Without the presence of a microbial partner, many epiphytic and terrestrial orchids may only reproduce through vegetative means.

Similar to other epiphytic orchids, *Bulbophyllum guamense* also requires space for attachment on the surface of its host tree and derives moisture from the atmosphere and nutrients from the humus of decaying bark or accumulated dust. Like other epiphytic

orchids, *B. guamense* grow on other trees mainly for physical support and does not obtain nutrients directly from the tree. This type of relationship is referred to as a commensal relationship, one in which one species benefits, and the other species derives neither benefit nor harm. Pseudobulbs and roots of *B. guamense* facilitate water and nutrient storage and rapid moisture absorption, respectively, and are thus critical for vegetative growth and reproduction (production of flowers, fruits, and seeds). Any direct damage to *B. guamense* plants can cause withering, rotting, and eventually death, thus halting or negatively modifying reproduction.

Because individuals of *Bulbophyllum guamense* require a host plant, the needs of host plants equate with needs of individual *B. guamense* plants. At minimum, host plants need precipitation during the rainy and dry seasons, soil, and sunlight. Therefore, the individual needs of *B. guamense* plants include the necessary amount of water, soil, nutrients, and sunlight required by the host plant. Observations of *B. guamense* in the wild report it grows on three native host plants (*Hernandia labyrinthica*, *Elaeocarpus joga*, and *Pisonia umbellifera*) and several other species such as *Artocarpus* sp., *Persea americana* (avocado) and *Areca catechu* (betel nut) (Stone 1970, p. 158; Zarones et al. 2015, in litt.). Taller trees such as *H. labyrinthica*, *E. joga*, and *P. umbellifera* provide a support system for individuals of *B. guamense* to grow higher in the canopy and thus receive more sunlight, as well as increased air movement to control humidity and prevent the introduction of disease. *B. guamense* has also been observed growing in trees along the forest edge, possibly for the same reasons. Because *B. guamense* is usually found growing in areas with at least partial sun exposure, individuals may require several or more hours of sunlight per day to complete their life cycle.

The Mariana Archipelago experiences a uniquely stable climate with daily temperatures ranging between 73 and 86 °F (22 and 30 °C). Due to the monsoon season in the western Pacific, there are distinct wet (rainy) and dry seasons. It still rains in the dry season, just much less than during the rainy season. It is reasonable to infer that individuals of *Bulbophyllum guamense* require warm air temperatures year-round and possibly distinct wet and dry seasons. The pear-shaped pseudobulbs provide water storage capacity to prevent dehydration during the long dry seasons or extremely high temperatures (Raulerson and Rinehart 1992, p. 90).

In summary, it is reasonable to conclude that individuals of *Bulbophyllum guamense* need a host tree or shrub and the species' basic needs, decaying bark and dust and/or humus, sunlight, precipitation during the wet and dry seasons, year-round warm climate, and a microbial partner.

Population Needs As with the individual needs of *Bulbophyllum guamense*, there is little information known about the species' population needs. We deduce what biological information we do know about *B. guamense* and the forest habitat, in combination with data from similar species at the genus level and basic plant biology, to make educated guesses about the species' population needs. In this Species Report, the working definition of a population for plants is: "a group of conspecific individuals that are in close proximity to each other (i.e., less than 1,000 m apart), and are presumed to be

genetically similar and capable of sexual (recombinant) reproduction (HPPRCC 2011, p. 1). By this definition there are at least 13 populations of *B. guamense*, nine on Guam and four on Rota. Below we discuss what we think are the needs of these populations.

The population needs of *Bulbophyllum guamense* include all of the needs of individual *B. guamense* plants described under Individual Needs, as well as adequate space for multiple large host trees and shrubs to grow, an adequate number of host trees and shrubs, sufficient quality and quantity of native limestone forest and mixed introduced forest subtypes of forest habitat on both Guam and Rota, sufficient space on the tree trunks and tree branches for the pseudobulbs to reproduce both vegetatively and by seed, successful pollination and seed set, wind and rain for seed dispersal, and high rates of recruitment and survival. The breeding and pollination systems of *B. guamense* have not been identified. Orchids in general are considered to have complex flower structures and pollination systems (Gamisch et al. 2014, p. 242). Orchid flowers are by definition complete flowers, meaning they have sepals, petals, stamens (male reproductive anatomy) and carpals (female reproductive anatomy). However, the primary defining trait of orchids is that the male and female components of flowers are fused into a structure called the column. The result is typically a single anther at the apex to the column.”

As further referenced in USFWS 2023d (pp. 18-19):

“Although it is unknown whether *Bulbophyllum guamense* is self-compatible (when flowers are able to pollinate themselves or other flowers on the same plant and produce viable seeds), relies all or in part on outcrossing (where flowers on one plant receive pollen from a flower on a different plant of the same species), or requires a pollinator (and if so, the degree of specificity regarding species), there are studies regarding the breeding systems of other species within the genus *Bulbophyllum*. Most species within the genus *Bulbophyllum* are self-compatible; some rely upon a pollinator and others do not (Gamisch et al. 2015, p. 2). Auto-pollination occurs in some *Bulbophyllum* species through either the lack of a rostellum, a piece of tissue that separates the male (anther) and female (stigma) components of the flower, the development of additional anthers contacting the stigma, or a stigmatic rostellum (Gamisch et al. 2014, pp. 244–245; Gamisch et al. 2015, p. 1). Most *Bulbophyllum* spp. are also capable of cross-pollination and rely upon one or more species of pollinators (Borba et al. 1999, p. 206; Gamisch et al. 2014, p. 245).

Flies are the most common pollinator of *Bulbophyllum* spp. (Gamisch et al. 2014, p. 243; Borba et al. 1999, p. 205; Tan et al. 2002, p. 1161; Teixeira et al. 2004, p. 499; Tan et al. 2006, p. 2429; Humeau et al. 2011, p. 591), and more rarely wasps and bees (Stpiczynska et al. 2018, p. 565). The flowers of *Bulbophyllum guamense* produce a faint unpleasant carrion-like scent (Guam Plant Extinction Prevention Program 2020, in litt.), which suggests flies (particularly carrion or dung flies) are a likely pollinator. Fruity scents tend to attract fruit flies (*Bactrocera* spp.) (Tan and Nishida 2007, p. 334). Flies within Calliphoridae (blow flies) and Sarcophagidae (flesh flies) prefer light yellow-green colored flowers that produce sweet odor signaling their food sources, or brown-purple flowers with excrement or rotting flesh odor signaling egg-laying sites (Wisniewska et al. 2019, p. 1185). There are also some plants with flowers of varying shades of yellow

which produce a carrion scent (Armstrong 2013, in litt.). Although many *Bulbophyllum* species produce volatile compounds to attract pollinators, they do not necessarily produce nectar. Nectar production capabilities vary among orchids, including *Bulbophyllum* spp. Orchids tend to utilize many deceptive mechanisms to attract and receive pollinators (Tan et al. 2006, p. 2429).

Further research regarding the presence or absence of a rostellum and general floral anatomy in combination with pollination observations will help to elucidate the breeding and pollination systems of *Bulbophyllum guamense*. Overall, populations of *B. guamense* likely depend upon a combination of both vegetative and sexual reproduction and need a diverse population structure including all age classes (seeds, seedlings, juveniles, and adults) spread out across sufficient quality forest habitat in order to successfully withstand disturbance (i.e., a stochastic event) and maintain resilience. Data from other *Bulbophyllum* spp. indicate that pollination depends upon a biotic (animal) source and therefore the presence of pollinators (e.g., flies). Populations of *B. guamense* also likely rely on a combination of self-pollination and out-crossing to maintain resilient populations.”

Threats: Because *Bulbophyllum guamense* primarily occurs in the native and mixed/secondary subtypes of forest habitat, is vulnerable to direct impacts and loss of habitat due to development, invasive animals, invasive plants, wildfire, and typhoon threats summarized in the General Effects section, above. As referenced in USFWS 2023d (p. 20):

“The nonnative Cuban slug (*Veronicella cubensis*) is considered one of the greatest threats to native plant species on Pacific islands (Robinson and Hollingsworth 2006, p. 2). These nonnative slugs are established on both Guam and Rota and are considered ubiquitous orchid pests as they eat both flowers and leaves of orchids (Badilles et al. 2010, in litt.; Jones 2020, in litt.)” Additionally, as referenced in USFWS 2023d (p. 21): “habitat degradation has contributed to a decrease in availability of native host plants as well as a decrease in individuals and populations of *Bulbophyllum guamense*, resulting in a decline in the overall range of *B. guamense*. Although *B. guamense* has adapted to utilize some nonnative species as host trees (e.g., betel nut), changes in forest composition and species diversity impact the availability of physical and biological resources as discussed above. Subsequent cascading impacts include reduced recruitment, reduced population sizes, and reduced connectivity. Cumulatively, this makes *B. guamense* populations more susceptible to stochastic events (reduced resiliency), and overtime more susceptible to catastrophic events (reduced redundancy). A concentration of *B. guamense* populations exist on Rota in the undeveloped Sabana area, and there is at least one large population of *B. guamense* on southern Guam, in the Naval Munitions Site. If a catastrophic event such as direct landfall of a super typhoon occurred on Rota or the southern half of Guam, it could substantially impact the viability of the species. As shrinking populations with reduced connectivity led to lower genetic diversity, the loss of populations on Guam has lowered the representation for *B. guamense*. For further information on how and what invasive plants impact the forest habitat, and therefore *B. guamense*, please see Willsey et al. (2019, entire) and the final rule to list *B. guamense* as a threatened species (USFWS 2015b, p. 49434).”

USFWS 2023d (p. 23) further indicates “Although there are currently no climate change studies that specifically address impacts to *Bulbophyllum guamense*, an increase in intensity and/or frequency of rainfall and super typhoons may result in negative impacts to *B. guamense* and other native species in the forest habitat, such as alterations in microhabitats and species reproductive cycles, and increases in prevalence of disease, flooding, and erosion.”

Conservation Actions: As referenced in USFWS 2023d (p. 23), the following actions to conserve the species are occurring:

“The Guam Plant Extinction Protection Program (GPEPP) is an island wide program to prevent the extinction of Guam’s native and rarest plants, including *Bulbophyllum guamense*. With the help of conservation partners, GPEPP helps to protect extant species, propagate species to preserve seeds and genetic material, and reintroduce propagated individuals to their native habitats. The program has propagated *B. guamense* in the nursery, as well as studied the symbiotic relationship between orchids and seed germination and mycorrhiza fungi. Currently, GPEPP has approximately 13,000 *B. guamense* seedlings in flasks. They report that *B. guamense* is easy to pollinate and produce viable seeds (i.e., successful germination), but that *B. guamense* is difficult to get established in the nursery. They have found that *B. guamense* grows more successfully around moss. GPEPP is setting up a misting system to help with establishment in the nursery and working on new strategies for getting the plants transferred from flasks. Further, GPEPP reports that habitat loss is the primary threat to the species (McConnell 2020, in litt.). Although GPEPP functions within Guam, the benefits to *B. guamense* will likely expand to populations of *B. guamense* on the island of Rota.”

Recovery Criteria: To be delisted, a minimum of 10 *Bulbophyllum guamense* populations, totaling 500 individuals, must be stable, secure, and naturally reproducing for a minimum of 20 years within secure and viable habitats. At least three such populations must occur on Guam and Rota. Threats to the species and the habitat of those plant populations and active conservation and monitoring must be in place (USFWS 2023b, p. 36-37).

Environmental Baseline – Status of *Bulbophyllum guamense* in the Action Area

Orchids are small and their habitat includes tree canopy areas where they may go undetected in surveys. Cobb (pers. comm. 2025) indicated one *B. guamense* was observed within the North Ramp construction footprint during the 2021 surveys and in the 2024 surveys, the one *B. guamense* in the North Ramp was re-located but it appeared to be dead based on a ground observation. Based on this information, our assessment is a small number of *B. guamense* may, at any time, be growing at the North Ramp site.

No *Bulbophyllum guamense* were recorded during surveys of the MSA-1 project footprint, and none were recorded within 10 ft (3 m) of the construction footprints. Additionally, no listed orchids were detected at the Tarague habitat enhancement site. A recent biological opinion addressing forest restoration at HMU indicates HMU may be occupied by as many as 30 *B. guamense* (USFWS 2025, p. 24).

Status of *Dendrobium guamense*

Species Description: As referenced in USFWS 2023e (pp. 8-11):

“*Dendrobium guamense* is an epiphytic orchid in the family Orchidaceae, and has no common name (Ames 1914, p. 14; WCSP 2012; Smithsonian Institution 2014). *Dendrobiums* are typically epiphytes with high ornamental, medicinal, and commercial value. Synonyms are *Grastidium guamense* (Ames) M.A. Clem. & D.L. Jones (GBIF 2019, Catalogue of Life, 2019), but *Dendrobium guamense* is the currently accepted scientific name. *Dendrobium guamense* leaves have a smooth edge, lack a petiole, and are approximately 4 in (10 cm) long and 0.28-0.6 in (7–15 mm) wide. The leaf sheath surrounding the base of the leaf is cylindrical. The plant produces two-flowered racemes on unbranched stems. Two small, white flowers emerge between two leaves and are open for one day. Fruit develops into pods that can hold thousands to millions of minute, dust-like seeds (Raulerson and Rinehart 1992, p. 98). The orchid has a storage organ called a pseudobulb, which is a thickened part of the stem between the leaf nodes. The pseudobulb is rooted in moss or other debris that accumulates in the joints and crevices of the host tree (detailed species description in Stone 1970 [p. 158] and Raulerson and Rinehart 1992 [p. 98]). Little is known about the life history of *Dendrobium guamense*. It can be terrestrial or epiphytic, where it grows on tree branches in the forest canopy at an average height of 12.9 ft (3.9 m); standard error = 0.2 ft [0.06 m], n = 1,209; GPEPP 2019, unpublished data; Navy, unpublished data). The orchid is typically found on tree branches in forests with canopy-filtered sunlight, but two of the plants from survey data were observed on a cliff face. *Dendrobium* species take advantage of the microclimates of tree trunks, lower branches, and under the canopy, and are found in shade or moderate light as well as along forest edges, where there are high light levels (Raulerson and Rinehart 1992, p. 98). The orchids obtain moisture and nutrients from symbiotic mycorrhizal fungi, which are often species specific in their host associations (Baskin and Baskin 2014, p. 910). The age of maturity and the lifespan of *Dendrobium guamense* are unknown. However, other orchid species have long lifespans (Dressler 1993, p. 226), requiring two to 10 or more years to reach sexual maturity.

Orchid flowers are bilaterally symmetrical and perfect (containing both female and male reproductive structures). *Dendrobium guamense* has synchronous flowering and blooms multiple times a year at the same time as other *Dendrobium* plants. Two white flowers appear at the same time and last only one day (Raulerson and Rinehart 1992, p. 98). Stone (1970, p. 158) noted that “numerous hybrids are known from cultivation” including one record of a hybrid of two other *Dendrobium* species collected in Guam. Orchids are often pollinated by insects, but some are able to self-pollinate (Stebbins 1957, p. 340). It is not known whether *D. guamense* requires an insect pollinator or can self-fertilize, but 72 percent of the genus is self-incompatible (Niu et al. 2018, p. 1). Epiphytic orchids often have brightly colored or fragrant flowers and nectar, or even chemical pheromones, designed to attract highly species-specific pollinators. Although *D. guamense* flowers are small and less conspicuous than other species of orchid, they are fragrant and flower synchronously, which suggests environmental cues may trigger more regional-scale pollination and seed set (Raulerson and Rinehart 1992, p. 98).

Epiphytic orchids produce numerous tiny seeds, which require highly efficient pollination to fertilize (Johnson and Edwards 2000, entire). Fertilized orchid seeds are so small they are dust-like, with almost no energy reserves. They have undifferentiated embryos with few cells, and either short-lived or no endosperm (nutritive tissue resulting from fertilization) (Baskin and Baskin 2014, p. 910). They are dispersed by wind and due to the lack of endosperm, they often require a fungal mycorrhizal symbiont to germinate (Baskin and Baskin 2014, p. 910). Mycorrhizal fungi provide energy to germinating seeds and nutrients to the immature and mature plants. These fungi obtain these nutrients through network of hyphae that grow into the host tree bark and accumulated moss and detritus. Once a mycorrhizal symbiont is met, an orchid seed germinates by swelling up and producing a covering of thin hair-like structures (trichomes) around the embryo. This initial structure is called the protocorm (Baskin and Baskin 2014, p. 910), and differentiates into leaves at the top and a tuber (called the pseudobulb in *Dendrobium guamense*) at the bottom. The pseudobulb is an energy storage organ that allows the orchid to survive periods of drought or dormancy. After the plant grows and begins to photosynthesize, the plant provides carbon energy to the fungi through carbohydrates production via photosynthesis which is transported down to the roots via phloem vascular tissue. Due to the orchid's life history requirements for highly efficient pollination (likely through unknown but species-specific pollinators), wind dispersal of tiny dust-like seeds with little to no energy reserves, and fungal mycorrhizal symbionts, *Dendrobium guamense* orchids likely persist in metapopulations. These life history characteristics result in highly clumped spatial distributions (as observed in field surveys) and require high levels of habitat connectivity between the populations that comprise the metapopulation. This type of habitat connectivity is affected by intact forest ecosystems.

Dendrobium guamense is endemic to the Mariana Islands and is found on the islands of Guam, Rota, Saipan, Tinian, Aguiguan, and Agrihan. More information on the physical environments of these islands can be found in the Forest Habitat Status Assessment for the Mariana Islands (Willsey et al. 2019) and the introduction to these Habitat Status Assessments (Harrington et al. 2019). There are two major substrate types in the Marianas Forest ecosystem: limestone substrate and volcanic substrate (Stone 1970, pp. 9, 14, 18–24; Falanruw et al. 1989, pp. 6–9; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, p. 243). Biologists have observed overlap of forest species on limestone and volcanic substrata, suggesting that physical properties may be more important than chemical properties of these substrates in determining vegetation characteristics (Mueller-Dombois and Fosberg 1998, pp. 262–264). Native canopy species in the forest ecosystem include, but are not limited to: *Artocarpus mariannensis*, *Barringtonia asiatica*, *Claoxylon* spp., *Cordia subcordata*, *Cyathea* spp., *Cyanometra ramiflora*, *Elaeocarpus joga*, *Ficus prolixa*, *Guamia mariannensis*, *Hernandia labyrinthica*, *H. sonora*, *Maytenus thompsonii*, *Merrilliodendron megacarpum*, *Ochrosia mariannensis*, *Pandanus dubius*, *P. tectorius*, *Pisonia grandis*, *Pouteria obovata*, and *Premna obtusifolia* (Falanruw et al. 1989, pp. 6–9; Raulerson and Rinehart 1991, pp. 6–7, 11, 14, 20, 24, 28, 33, 50, 52–53, 62–63, 72, 91, 96, 104; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, pp. 257, 268, 270–271; Wiewel et al. 2009, pp. 206–207).

Native subcanopy species include but are not limited to: *Aglaia mariannensis*, *Aidia cochinchinensis*, *Allophylus timoriensis*, *Cyathea aramaganensis*, *Eugenia palumbis*, *E. reinwardtiana*, *Hibiscus tiliaceus*, *Neisosperma oppositifolia*, *Psychotria mariana*, and *Xylosma nelsonii* (Stone 1970, pp. 9, 14, 18–24; Falanruw et al. 1989, pp. 6–9; Raulerson and Rinehart 1991, pp. 13, 47, 56, 59, 68–69, 77, 84, 88; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, pp. 252–253, 257, 268, 272); and native understory species include but are not limited to: *Discocalyx megacarpa*, *Hedyotis* spp., *Nephrolepis bisserrata*, *N. hirsutula*, *Phyllanthus marianus*, and *Piper guamense* (Falanruw et al. 1989, pp. 6–9; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, pp. 247, 268).”

Status and Distribution: As referenced in 2023e (pp. 24-26):

“Current resiliency, redundancy, and representation of *Dendrobium guamense* was evaluated from survey data that was grouped into populations (Table 4); all available survey data for *D. guamense* was compiled as point locations. Less accurate locations from older surveys were assigned to geo-reference points from associated place names, expert opinion, or other information from the voucher specimen or survey data. Older observations were considered present unless current information showed significant habitat alterations. This compilation of observations resulted in 26 populations, ranging in size from 1 to more than 5,000 plants.”

An estimated 13,040 *Dendrobium guamense* occur within 26 range-wide populations (USFWS 2023e, p. 26). In summary, an estimated 12,421 individuals grow within 14 populations in Guam; 25 individuals occur in the Finegayan Northwest Field population.

Life History: As referenced in USFWS 2023e (p.9): “the age of maturity and the lifespan of *Dendrobium guamense* are unknown. However, other orchid species have long lifespans (Dressler 1993, p. 226), requiring two to 10 or more years to reach sexual maturity.”

Individual Needs: As referenced in USFWS 2023e (p. 12-14):

“*Dendrobium guamense* is predominantly found on native trees. Of the 43 host species (predominately trees) recorded for *Dendrobium guamense*, 72 percent were native, hosting 76 percent of the individual orchids (Table 1). The one significant exception may be the introduced tree *Areca catechu*, which seems to be a suitable host for this orchid. Excluding this single introduced host tree, 93 percent of *Dendrobium guamense* orchids were found on native trees.

Dendrobium guamense did show a preference for the north and northeast sides of host trees, with very few individuals recorded from the southern exposed faces. However, it should be noted that the sample size used to evaluate these cardinal preferences was small (16 orchids).

With the exception of avoiding the driest (less than 83 in [2,100 mm] annual rainfall) and hottest (greater than 80 °Fahrenheit (F); 26 °Celsius [C] annual minimum) conditions, *Dendrobium guamense* seems to have little specificity for precipitation or temperature within the current ranges recorded on Guam, Rota, Tinian, Saipan, and Aguiguan. The

orchid occupies sites across gradients in space that span large differences in rainfall, temperature, and elevation within the ranges on these islands. Annual rainfall in the Marianas Forest ecosystem ranges from 78 to 100 in (2,000 to 2,500 mm), with a rainy season (June or July through October or November) accounting for about two-thirds of the annual rainfall. Temperature in the Marianas Forest ecosystem ranges from 75 to 82 °F (24 to 28 °C), with low and high extremes of 64 and 95 °F (18 and 35 °C).

Elevation also contributes to variations in vegetation, as observed on Mt. Alutom, Mt. Almagosa, Mt. Lamlam, and Mt. Bolanus on Guam, the Rota Sabana, and the slopes of the northern islands (Stone 1970, pp. 9, 14, 18–24; Falanruw 1989, pp. 4–6; Mueller-Dombois and Fosberg 1998, pp. 262–264). However, *Dendrobium guamense* is well represented across these gradients in elevation. The moisture-retaining, moss- and epiphyte-rich species assemblages of the forest ecosystem in the Mariana Islands do not show a strong correlation with elevation or temperature. This is also true for *D. guamense*, which can be found near the coast at some locations and at mid to high elevations at other locations.”

Threats: Threats to *Dendrobium guamense* include development, introduced plants and animals, wildfire, and typhoons as summarized in the General Effects section, above. The clumped distribution patterns of *Dendrobium guamense* suggest the importance of habitat connectivity of intact native forests for each island’s population (USFWS 2023e, p. 8). In addition, this orchid species is vulnerable to slug predation. As referenced in USFWS 2023e (p. 17):

“Nonnative slugs are known to attack orchids, which places *Dendrobium guamense* at risk from slug predation on the islands of Guam and Rota (Badilles et al. 2010, p. 7; Cook 2012, in litt.). The nonnative Cuban slug, *Veronicella cubensis*, is one of the greatest threats to native plant species on Pacific islands (Robinson and Hollingsworth 2006, p. 2). The Cuban slug is a recent introduction to Micronesia. These terrestrial mollusks are generalist feeders, can attack a wide variety of plants, and switch food preferences if potential food plants change (Robinson and Hollingsworth 2006, p. 2). The Cuban slug has been known on Rota since 1996, occurs in large numbers, and is currently a pest to agricultural and ornamental crops on the island (Badilles et al. 2010, pp. 2, 4, 8). Some agricultural losses are reported to be as high as 70 percent of the crop (Badilles et al. 2010, p. 7).”

Recovery Criteria: To be delisted, a minimum of 10 *Dendrobium guamense* populations, totaling 500 individuals, must be stable, secure, and naturally reproducing for a minimum of 20 years within secure and viable habitats. At least three such populations must occur on Guam and Rota. Threats to the species and the habitat of those plant populations and active conservation and monitoring must be in place (USFWS 2023b, p. 36-37).

Environmental Baseline - Status of *Dendrobium guamense* in the Action Area

Two individual *Dendrobium guamense* individuals and the host trees they are growing on are within the area that will be cleared during construction at North Ramp. No other *D. guamense* were detected within the project footprint and buffer areas in the project footprint vicinities.

Status of *Tuberolabium guamense*

Species Description: USFWS 2023f (pp.9-10) indicates:

“*Tuberolabium guamense* (Ames) is an epiphytic orchid in the family Orchidaceae (Ames 1914; Wood 1990; WCSP 2012a, b) and has no common name. Synonyms are *Saccolabium guamense* (Blume) and *Trachoma guamense* (Ames) (Garay 1972; Raulersen and Rhinehart 1992, p. 127; Smithsonian Institution 2014). The leaves are ovate to oblong (13 x 1.5 cm), leathery in texture with a smooth edge and lacking a petiole. The leaves grow out of conspicuous roots, which elevate the plant above tree trunks on which it grows (detailed species description in Raulerson and Rinehart 1992, p. 127).”

As referenced in USFWS 2023f (p. 4):

“*Tuberolabium guamense* *Tuberolabium guamense* is endemic to the Mariana Islands and is found on the islands of Guam (Territory of Guam) and Rota (Commonwealth of the Northern Mariana Islands). The final listing rule for *Tuberolabium guamense* (previously called *Trachoma guamense*) includes the islands of Guam, Rota, Aguiguan (or Aguijan), and Tinian as part of the species range (USFWS 2015b, p. 59427). This range determination was based on a series of voucher specimens from the Herbarium at the University of Guam and listed on the Consortium of the Pacific Herbarium website in 2012. However, a review of the vouchers used to determine the species range for the listing rule identified some inconsistencies between the vouchers and the published information (see Raulerson and Rinehart 1992, p. 127) on the species. The published information is considered as the correct range of *Tuberolabium guamense*: it is found on Guam and Rota and does not include the islands of Aguiguan and Tinian as reported in the final listing rule (USFWS 2015b, p. 59427). More information on the physical environments of these islands can be found in the Forest Habitat Status Assessment for the Mariana Islands (Willsey et al. 2019) and the introduction to these Habitat Status Assessments (Harrington et al. 2019).”

Status and Distribution: USFWS 2023f (p. 26) indicates there are eight populations of *Tuberolabium guamenses* in Guam totaling 76,393 counted orchids, and 2 populations on Rota with a total of 239 counted orchids. USFWS 2023e (pp. 27-28) further details the following:

“On Guam, 57 percent (43,663 orchids) of the recorded *Tuberolabium guamense* were located in northern Guam in populations A–E, while 43 percent were found in southern Guam in populations F–H (32,730 orchids). While DoD lands have been more extensively surveyed than public lands in Guam, which may affect the distribution of current detections, recent surveys for *T. guamense* on non-DoD lands which have been performed as part of the RASP Initiative (RASP 2023) are expected to expand into additional survey sites.

On Rota, Zarones et al. (2015, pp. 1–15) conducted a set of surveys for *Tuberolabium guamense*. They observed approximately 239 orchids (populations J and I). No orchids were recorded on 12 of the 18 surveys transects. The method used to estimate the total number of orchids in the Sabana area is not explicitly stated. However, it appears that an average number of orchids per hectare was applied across the entire (3,390 ha) area,

regardless of the presence/absence data. Given the large number of absence data (67 percent of all transects), this approach will not yield a reliable estimate of the total number of orchids. Additional surveys still need to be conducted on Rota, and populations on both islands that were impacted by recent typhoons need to be monitored.”

Life History: As referenced in USFWS 2023f (pp. 4-5): “Epiphytic orchids like *Tuberolabium guamense* grow in the forest canopy and sub-canopy and use the tree only as a physical substrate upon which to grow (they are not parasites). They obtain moisture and nutrients from mutually symbiotic relationships with mycorrhizal fungi, which are often species-specific in their host associations (Baskin and Baskin 2014, p. 910). *Tuberolabium guamense* orchids usually occur low in the canopy, on tree trunks or shrubs in low sunlight.

Little is known about the life history of *Tuberolabium guamense*. As an epiphytic orchid, *T. guamense* plants are supported by the tree trunk and lower branches. They cling strongly onto their hosts with a well-developed root system and use the moisture from the air and bark of the host for nourishment. *T. guamense* takes advantage of the microclimate of the trunk and lower branches and prefers shade or moderate light to full sunlight (Raulersen and Rhinehart 1992, p. 127). The age of maturity and the lifespan of *Tuberolabium guamense* are unknown. However, other orchid species have long lifespans (Dressler 1993, p. 226), requiring two to 10+ years to reach sexual maturity. Most orchids take two or three years (Corbin 2016); however, epiphytic orchids may need up to 30 years to reach maturity (Zotz 1995).”

As referenced in USFWS 2023f (pp 13-14):

“Seedpods of *Tuberolabium guamense* take months to mature. After flowering in September or October, the pods finally release seeds in May or June. Epiphytic orchids require highly efficient pollination to produce fertile seeds (Johnson and Edwards 2000, entire), which are numerous and tiny. Fertilized orchid seeds are so small they are dust-like, with almost no energy reserves. They have undifferentiated embryos with few cells, and either short-lived or no endosperm, the nutritive tissue resulting from fertilization. They are dispersed by wind and due to the lack of endosperm they likely require a fungal mycorrhizal symbiont to germinate (Baskin and Baskin 2014, p. 910).

Many orchid species require a microbial partner, such as mycorrhizal fungi, for seed germination, which is also likely for *Tuberolabium guamense* seedlings (UFWS 2020, p. 8). Mycorrhizal fungi provide energy to germinating seeds and nutrients to the growing or mature plant. These fungi obtain nutrients through a network of hyphae that grow into the host tree bark and accumulated moss and detritus. Once a mycorrhizal symbiont is met, an orchid seed germinates by swelling up and producing a covering of thin hair-like structures (trichomes) around the embryo. This initial structure is called the protocorm (Baskin and Baskin 2014, p. 910), and differentiates into leaves at the top and roots at the bottom. After the plant grows and begins to photosynthesize, the plant provides carbon energy to the fungi through carbohydrate production which is transported down to the roots via phloem vascular tissue.

Due to the orchid's life history requirements for highly efficient pollination, wind dispersal of tiny dust-like seeds with little to no energy reserves, and fungal mycorrhizal symbionts, *Tuberolabium guamense* orchids likely persist in metapopulations. These life history characteristics result in highly clumped spatial distributions (as observed in field surveys) and require high levels of habitat connectivity between the populations that comprise the metapopulation. This type of habitat connectivity is highly dependent on intact forest ecosystems.

There are two major substrate types in the Marianas Forest ecosystem: limestone substrate and volcanic substrate (Stone 1970, pp. 9, 14, 18–24; Falanruw et al. 1989, pp. 6–9; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, p. 243). Biologists have observed overlap of forest species on limestone and volcanic substrata, suggesting that physical properties may be more important than chemical properties of these substrates in determining vegetation characteristics (Mueller-Dombois and Fosberg 1998, pp. 262–264). Native canopy species in the forest ecosystem (underlined taxa are known hosts of *Tuberolabium guamense* – see 1) include but are not limited to: *Artocarpus mariannensis*, *Barringtonia asiatica*, *Claoxylon* spp., *Cordia subcordata*, *Cyathea* spp., *Cyanometra ramiflora*, *Elaeocarpus joga*, *Ficus prolixa*, *Guamia mariannensis*, *Hernandia labyrinthica*, *H. sonora*, *Maytenus thompsonii*, *Merrilliodendron megacarpum*, *Ochrosia mariannensis*, *Pandanus dubius*, *P. tectorius*, *Pisonia grandis*, *Pouteria obovata*, and *Premna obtusifolia* (Falanruw et al. 1989, pp. 6–9; Raulerson and Rinehart 1991, pp. 6–7, 11, 14, 20, 24, 28, 33, 50, 52–53, 62–63, 72, 91, 96, 104; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, pp. 257, 268, 270–271).

Native subcanopy species include but are not limited to: *Aglaia mariannensis*, *Aidia cochinchinensis*, *Allophylus timoriensis*, *Cyathea aramaganensis*, *Eugenia palumbis*, *E. reinwardtiana*, *Hibiscus tiliaceus*, *Neisosperma oppositifolia*, *Psychotria mariana*, and *Xylosma nelsonii* (Stone 1970, pp. 9, 14, 18–24; Falanruw et al. 1989, pp. 6–9; Raulerson and Rinehart 1991, pp. 13, 47, 56, 59, 68–69, 77, 84, 88; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, pp. 252–253, 257, 268, 272); and native understory species include but are not limited to: *Discocalyx megacarpa*, *Hedyotis* spp., *Nephrolepis bisserrata*, *N. hirsutula*, *Phyllanthus marianus*, and *Piper guamense* (Falanruw et al. 1989, pp. 6–9; Ohba 1994, pp. 19–29; Mueller-Dombois and Fosberg 1998, pp. 247, 268).”

Individual Needs: As referenced in USFWS 2023f (p. 14):

“There are no historic records of host plants used by *Tuberolabium guamense*. Current host plant use has been recorded during recent surveys (Table 1). However, data from these surveys do not indicate the relative frequency of occurrence of the host plants, so it is not possible to evaluate host-plant preferences by the orchid. It is apparent from the survey data that *T. guamense* is predominantly found on native vegetation, and rarely on introduced vegetation types (Table 1). The only nonnative species *T. guamense* has readily been observed on is the invasive tree *Vitex parviflora* in Guam, which seems to be a suitable host for the orchid.”

Additionally, as detailed in USFWS 2023f (p. 17):

“With the exception of avoiding the driest (less than 83 in (2,100 m)) annual rainfall) and hottest (greater than 80° Fahrenheit [F]; 26° Celsius [C] annual minimum) conditions on Rota, *Tuberolabium guamense* seems to have little specificity for precipitation within the current ranges recorded on Guam and Rota. The orchid occupies sites across gradients in space that span large differences in rainfall, temperature, and elevation within the ranges on these islands. Annual rainfall in the Marianas Forest ecosystem ranges from 78 to 100 in (200 to 250 cm), with a rainy season (June or July through October or November) accounting for about two-thirds of the annual rainfall. Temperature in the Marianas Forest ecosystem ranges from 75° to 82° F (24 to 28° C), with low and high extremes of 64 and 95° F (18 and 35° C).

Elevation also contributes to variations in vegetation, as observed on Mt. Alutom, Mt. Almagosa, Mt. Lamlam, and Mt. Bolanus on Guam, the Rota Sabana, and the slopes of the northern islands (Stone 1970, pp. 9, 14, 18–24; Falanruw 1989, pp. 4–6; Mueller-Dombois and Fosberg 1998, pp. 262–264). However, *Tuberolabium guamense* is well represented across these gradients in elevation. The moisture-retaining, moss- and epiphyte-rich species assemblages of the forest ecosystem in the Mariana Islands do not show a strong correlation with elevation or temperature. This is also true for *T. guamense*, which can be found near the coast at some locations and at mid to high elevations at other locations.”

Threats: Threats to *Tuberolabium guamense* include development, introduced plants and animals, wildfire, and typhoons as summarized in the General Effects section, above. In addition, this orchid species is vulnerable to slug predation. As referenced in USFWS 2023f (p. 20):

“Non-native slugs are known to attack orchids, which places *Tuberolabium guamense* at risk from slug predation on the islands of Guam and Rota (Badilles et al. 2010, p. 7; Cook 2012, in litt.). The nonnative Cuban slug, *Veronicella cubensis*, is one of the greatest threats to native plant species on Pacific islands (Robinson and Hollingsworth 2006, p. 2). The Cuban slug is a recent introduction to Micronesia. These terrestrial mollusks are generalist feeders, can attack a wide variety of plants, and switch food preferences if potential food plants change (Robinson and Hollingsworth 2006, p. 2). The Cuban slug has been known on Rota since 1996, occurs in large numbers, and is currently a pest to agricultural and ornamental crops on the island (Badilles et al. 2010, pp. 2, 4, 8). Some agricultural losses are reported to be as high as 70 percent of the crop (Badilles et al. 2010, p. 7).”

Recovery Criteria: To be delisted, a minimum of 10 *Tuberolabium guamense* populations, totaling 500 individuals, must be stable, secure, and naturally reproducing for a minimum of 20 years within secure and viable habitats. At least three such populations must occur on Guam and Rota. Threats to the species and the habitat of those plant populations and active conservation and monitoring must be in place (USFWS 2022, p. 36-37).

Environmental Baseline - Status of *Tuberolabium guamense* in the Action Area

One hundred *Tuberolabium guamense* plants, growing on 19 host trees are within the North Ramp project footprint. No *T. guamense* were found in the buffer areas surrounding the project footprints and none were found at the MSA-1 project site.

Status of the Sihek

Species Description

The sihek was listed under the ESA as endangered in 1984 (USFWS 1984, 9 pp.). A revised recovery plan for the sihek was completed in 2008 (USFWS 2008, 117 pp.). On October 28, 2004, the Service designated critical habitat for the sihek on approximately 376 ac (152 ha) in the fee simple portion of the Refuge (USFWS 2004, 117 pp.).

The sihek is endemic to the island of Guam in the Mariana Islands. Other subspecies, *Todiramphus* [=Halcyon] *c. pelewensis* and *T. c. reichenbachii*, occur on Palau (Republic of Palau) and Pohnpei (Federated States of Micronesia), respectively. The Guam subspecies is a small, sexually dimorphic forest sihek (Baker 1951, pp. 227–228) with metallic green-blue wings, a large head, and a strong beak. The adult male has a cinnamon-brown head, neck, upper back, and underparts; females are similar to males but slightly larger, with pale white breast feathers. A black line extends around the back of the neck and the eye ring is black (Jenkins 1983, p. 21; Smithsonian National Zoo and Conservation Biology Institute 2024, p. 1).

The sihek is extirpated in the wild in Guam but persists in captivity at the DAWR facility and 24 U.S. mainland zoos and institutions. In response to the decline of Guam's native birds in the 1980s, the Association of Zoos and Aquariums (AZA) initiated the Guam Bird Rescue Project. Between 1984 and 1986, 29 sihek were translocated from Guam to zoos in the U.S. mainland to start a captive breeding program. The breeding program has been managed under the auspices of the AZA's *Micronesian Kingfisher Species Survival Plan* (Bahner et al. 1998, p. 54).

As described below, in 2024 the Service, in collaboration with conservation partners, established an experimental population of sihek on the island of Palmyra (under section 10(j) of the ESA), to address needs within the captive care population and to facilitate future reintroduction of the species to Guam.

Life History

In the wild, sihek nest in cavities and feed primarily in mature, second growth limestone forest, and, to a lesser degree, in scrub limestone forest (Jenkins 1983, pp. 22–23). Sihek are also known to use coastal strand vegetation containing coconut palm as well as riparian habitat. However, Jenkins (1983, p. 22) reported the sihek was probably most common along the edges of mature limestone forest. Few data exist about specific nest sites of the sihek in the wild, but in one study in northern Guam (Marshall 1989), 16 nest sites were correlated with closed canopy cover and dense understory vegetation. The report by Marshall (1989) indicated that sihek nest cavities were excavated from the soft, decaying wood of standing dead trees averaging 43cm (17 in) in diameter (Marshall 1989, p. 475). Sihek nests have been reported in a number of tree species including *Ficus* spp. (banyan), *Cocos nucifera* (coconut), *Artocarpus* spp. (breadfruit), *Pisonia*

grandis (umumu), and *Tristiropsis obtusangula* (faniok) (Baker 1951, p. 228; Jenkins 1983, p. 24; Marshall 1989, p. 475).

Sihek breeding activity in the wild is thought to be concentrated from December to July (Baker 1951, p. 228; Jenkins 1983, p. 24). Pairs may excavate their own nests in soft trees, arboreal termitaria (the nests of termites [*Nasutitermes* spp.]), arboreal fern root masses, or they may utilize available natural cavities such as broken tree limbs (Jenkins 1983, p. 24; Marshall 1989, p. 474). Jenkins (1983, p. 23) observed that some excavated cavities were never used as nesting sites, which suggests that the process of excavating nest sites may be important in pair-bond formation and maintenance.

Both male and female sihek incubate eggs, and brood and feed nestlings (Jenkins 1983, p. 24). Clutch sizes from wild populations (n=3) were either one or two eggs (Baker 1951, p. 228; Jenkins 1983, p. 24) and clutch sizes of one to three eggs have been reported in the captive population (Bahner et al. 1998, p. 21). Incubation, nestling, and fledgling periods for populations of sihek in the wild are unknown. However, incubation and nestling periods of captive birds averaged 22 and 33 days, respectively (Bahner et al. 1998, p. 21).

Although there is still more to learn about the breeding behavior of sihek, it is known that the nest excavation and courtship stages are crucial to successful reproduction. Sihek excavate multiple cavities in trees before selecting a suitable nest site. Courtship includes cavity excavation, male feeding the female, and vocal duetting (simultaneous calling between members of a pair). These activities are common and are thought to function in both pair-bond maintenance and territorial maintenance (USFWS 2008, p. 24; Bahner et al. 1998, p. 18). The breeding season for this species in Guam is reported to range from December to June, however, within the managed population (in captivity) reproduction occurs in all months of the year with January through July being the prime breeding period. During the breeding season, it is important to minimize disturbance within the territorial range of breeding pairs to avoid affecting reproduction. Additionally, anything that disrupts the availability of prey items in their territory would be detrimental and would negatively affect sihek. There is no known recommended buffer around active sihek nests; however, in captivity nesting sihek have sometimes been monitored by cameras to avoid disturbing breeding birds (Bahner et al. 1998).

In the wild, the sihek were known to feed on invertebrates and small vertebrates, including insects, segmented worms, hermit crabs, skinks, geckoes, and possibly other small vertebrates (Marshall 1949, p. 210; Baker 1951, pp. 228–229; Jenkins 1983, p. 23). The species typically foraged by perching motionless on exposed branches or telephone lines and swooping down to capture prey off the ground with their bill (Jenkins 1983, p. 24). They also captured prey off nearby foliage and have been observed gleaning insects from bark (Maben 1982, p. 78).

Records of sihek distribution and intraspecific territorial behavior suggest this species maintains exclusive year-round territories in the wild (Jenkins 1983). Research and observations of the related Pohnpei sihek show this species has a ‘helper’ social system where birds from previous nests may stay in the parental territory for several years. The closely related Pohnpei kingfisher defend their approximately 8.1 ha (20 ac) territories from conspecifics (Kesler and Haig 2007a, pp. 386–387). Kesler and Haig (2007b, pp. 769–770) determined that kingfisher

home ranges on Pohnpei consist of mixed forest and open areas and at least part of this area includes mature forest. It should be noted that sihek territories may differ from Pohnpei Micronesian kingfisher territories due to differences in forest structure (Mueller-Dombois and Fosberg 1998, pp. 269–275, 288–291). However, information on the related Pohnpei kingfisher as a surrogate species to the sihek represents the best available scientific information on territory size and home ranges in the Pacific islands to date.

The life expectancy of the sihek in the wild is unknown. However, demographic data from captive sihek suggest that life history traits such as lifespan and reproductive span differ between the sexes. In captivity, males have a longer lifespan (23 years) than do females (15 years). Both males and females can reproduce at one year of age. In captivity, males have been observed to breed as old as 19 years, while females have not been observed to breed beyond the age of 12 (AZA 2014, p. 4).

Status and Distribution

The sihek is believed to have been extirpated in the wild by 1988 (Wiles et al. 2003) and is now found only in captivity (Bahner and Bier 2007) and in an experimental population on Palmyra Atoll (88 FR 19880).

Historically, sihek was considered “fairly common” and occurred throughout forested areas in Guam in 1945 (Baker 1951, p. 229). Populations in southern and central Guam disappeared by the 1960s (Jenkins 1983, p. 25) and 3,023 individuals were recorded in 1981 in northern Guam (Engbring and Ramsey 1984, p. 34). The northern Guam population subsequently declined rapidly, and by 1985, fewer than 30 individuals were recorded in Guam (Marshall 1989, p. 474) and the taxon was considered extirpated from the wild by 1988 (Wiles et al. 2003, p. 1,354). Predation by the brown treesnake is considered the main cause of the decline of the sihek population in Guam (Savidge 1987, USFWS 2008, p. iv). Between 1984 and 1986, 29 sihek were captured and sent to zoological institutions in the U.S. mainland (Hutchins et al. 1996, p. 4).

Between 1984 and 1986, 29 sihek were translocated to several zoological institutions in the mainland United States to begin a captive propagation program. By 1990, the captive population reached 61 individuals and hovered around this number of individuals until 2003 ($\lambda = 1.00$) due to high mortality and poor reproductive success. By 2014, the captive population reached the maximum population size of 157, more than doubling in size (mean $\lambda = 1.055$). Since 2014, space available has been limited resulting in a managed population decline of 3.4% and population growth rate of 0.976 (Newland and Ferrie 2020). In 2020, there were 135 sihek in captivity distributed across 25 institutions (24 Association of Zoos and Aquariums accredited institutions in the mainland United States and a breeding facility in Guam) (Newland and Ferrie 2020).

In April 2023, the Service established a 10(j) designation for sihek to facilitate translocation of the species to an island outside its historic range. A Final Environmental Assessment for the release was finalized in January 2023. This effort was undertaken to address the conservation needs of the species; two independent population models indicated that current reproductive output at captive facilities would result in extinction in the near to mid term without action to facilitate releases into the wild. With efforts to control brown treesnake in a way that supports

reintroduction of sihek to Guam still underway, the 10(j) population allows for the furtherance of species conservation and supports the overall health of the species. Further, the introduction to an island outside their historic range is intended to provide valuable information to support additional releases, ultimately with the goal of reestablish the species on Guam and recovering the species in the wild (USFWS 2023g). On August 28, 2024, nine sihek were transported to Palmyra Atoll and released from their aviaries between September 21 and 24, 2024. Future releases are planned for subsequent years on Palmyra with the intent to have up to 20 introduced individuals as part of the population.

The Final Environmental Assessment for the introduction of sihek to Palmyra includes the following description in the Purpose and Need:

“The Service and partners propose to release sihek at Palmyra Atoll, which is outside its historical range, for the following purposes: (1) support increased reproductive output by the ex situ conservation program by providing a location to host the additional birds and potentially motivating new institutions to join the ex situ conservation program; and (2) develop and refine release and monitoring methods to be applied when reestablishing populations on Guam necessary to recover the species. Release of sihek at Palmyra Atoll will improve the likelihood of successful reintroduction and recovery on Guam by: (1) providing the opportunity to develop and test release and monitoring techniques, (2) providing information on the sihek’s ability to survive in the wild, (3) assessing how much human intervention is required to support a wild population, (4) increasing the global population of sihek as an extension of the ex situ population as well as invigorating the breeding program, and (5) serving as a source of wild-hatched birds for future releases on Guam or other sites.” (USFWS 2023g, p. 4).

Threats

The Service intends to reintroduce the sihek to Guam. For that effort to be successful, the following threats need to be addressed. The following discussion is adapted from Service (2014, p. 2):

Loss or Degradation of Habitat

Incremental habitat loss on Guam due to fire, especially in southern Guam (Mafnas 2010), and urban and agricultural development is increasingly threatening the long-term conservation and recovery potential of the sihek. Ongoing and proposed plans by DoD to expand training and operations in Guam are threatening much of the remaining sihek habitat in northern Guam. The persistence of large, feral ungulate populations is likely to further degrade remaining forest habitats, thus lowering their value for sihek conservation. Collectively, this incremental loss narrows the available habitat to focus conservation and reintroduction efforts and achieve recovery goals for the species.

Predation

Predation risk from brown treesnakes currently prevents effective reintroduction of the sihek to Guam. Tools to manage brown treesnakes at a landscape level are beginning to be deployed, but it will take time before these tools are effective enough for the reintroduction of sihek in Guam.

Stochastic Events

Typhoons will continue to degrade forest and the affected forest areas may require several years to regenerate. Although birds in the Mariana Islands have evolved with typhoons, typhoons in concert with low population numbers, habitat loss, and behavioral and genetic consequences of captive breeding could negatively affect the conservation of the sihek. Climate models indicate that typhoons in the northwestern Pacific are expected to increase in intensity, frequency, and duration by 2200 and continue to increase further into the future (Emanuel et al. 2008, p. 360). These storm increases will likely have a significant effect on habitat and survival of listed species in Guam.

Survival and Recovery Needs

For purposes of this consultation, the survival need of sihek in the wild is assumed to be the reproduction, numbers, and distribution of sihek necessary to support a persistent population on Guam assuming the ongoing protection of the ESA. However, as sihek are currently extirpated from Guam (i.e., not surviving on Guam), we focus on the recovery needs of sihek (which would also provide for their survival once restored to Guam). For purposes of this consultation, the recovery need of sihek is the reproduction, numbers, and distribution of sihek on Guam assuming the threats to the species have been addressed such that the protections of the ESA are no longer necessary, i.e., the species does not meet the definition of a threatened or endangered species. Below we describe our assessment of the reproduction, numbers, and distribution of sihek needed for recovery as a means of assessing the effects of the proposed action on the collective survival and recovery of sihek.

The revised recovery plan for sihek (USFWS 2008) calls for the following criteria to be met for delisting. First, there must be a population of 1,000 adult sihek in both northern and in southern Guam. In addition, both populations must be either stable or increasing based on quantitative surveys or demographic monitoring that demonstrates an average intrinsic population growth rate of greater than 1.0 over a period of at least 10 consecutive years. Finally, sufficient habitat, based on quantitative estimates of territory and home range sizes, must be protected and managed to reach the population size and trajectory criteria identified above.

The long-term stability of a population of 1,000 adults is dependent on juvenile sihek being present in the population. Population targets for juvenile sihek were not provided, therefore, we estimated the number of juvenile sihek required for a stable population of siheks using demographic data from the Tuamotu kingfisher (*Todiramphus gambieri*; Kesler et al. 2012, p. 1005) and the popbio package (Stubben and Milligan 2007) in the statistical program R (R Core Team 2014). Based on that assessment, 1,616 juvenile sihek would be required to sustain a population of 1,000 adult sihek.

Sihek Habitat Necessary for Recovery

Survival and recovery of the sihek has required maintaining a population in captivity while threats from the brown treesnake are addressed in Guam. Successful recovery of the sihek is dependent on protecting enough habitat within the sihek historical range to support two subpopulations upon reintroduction to northern and southern Guam.

In December 2014, we conducted detailed habitat assessment for the sihek in Guam (USFWS 2014b). Our goals were to: 1) to identify lands suitable for reintroduction of the species; 2) to determine how much habitat was needed to support recovery of the species, based on the sihek recovery plan criteria. The methods used to calculate sihek habitat are provided below.

Habitat Needed to Support Sihek Survival and Recovery

The following analysis was completed to determine the amount of sihek habitat in Guam that must be protected and managed to support the recovery of this species. This analysis relies on known and estimated life history requirements of the sihek and closely related species, and the findings in the final revised recovery plan for the sihek (USFWS 2008).

As noted in Status and Distribution above, sihek use a mosaic of forested and open habitats for foraging and breeding. However, as forested habitats, especially mature forest, are likely limiting, the analysis focused on identifying forested habitats as habitat for the sihek. This approach was taken for two reasons. First, sihek need forested habitat for breeding, so forested habitat is essential to the species. Second, typhoon impacts to forested habitat are not well understood. Therefore, we focused on forested habitat in describing the sihek habitat needed for its survival and recovery in the wild in Guam. All areas identified as limestone, ravine, coconut, and palma brava (*Heterospatha elata*) forests in the 2006 Forest Service landcover map of Guam (Liu and Fischer 2006) were considered to be potential sihek habitat. The amount of available habitat was updated by removing all forested areas cleared since the landcover map was completed. This process used 2011 satellite imagery of Guam (USFWS, unpublished data) and other reported clearing (USFWS, unpublished data). The remaining forested areas were subdivided into potential and non-potential habitat based on forest patch area and isolation. Forest areas that were sufficiently large to hold a sihek territory were identified using a “territory building” algorithm (USFWS unpublished algorithm) developed using the Raster package (Hijmans 2014) in the statistical program R. This algorithm accounted for the size of the territory and percentage of forested habitat per territory, thereby omitting areas that were insufficient in size or placement of forested habitat to meet the criteria of a sihek territory. We classified forest patches as too isolated for habitat if they were of insufficient size to hold three or more territories and if they were greater than 0.87 mi (1.4 km) (the maximum dispersal distance reported by Kesler and Haig 2007c for the Pohnpei Micronesian sihek) from the nearest neighboring forested area supporting three or more territories. The results of these analyses indicated in 2015 there was approximately 15,089 ac (6,106 ha) of sihek habitat in northern Guam and 13,314 ac (5,392 ha) of sihek habitat in southern Guam.

Estimated Population Size and Area Needed for Recovery:

1. *Baseline Acreage Estimate.* The revised recovery plan for sihek (USFWS 2008) calls for a population of 1,000 adult sihek in both northern and in southern Guam. As noted in Status and Distribution above, territory size estimates for the Pohnpei kingfisher, a surrogate species to the sihek, represent the best available scientific information on territory size and home ranges in the Pacific islands to date. Therefore, the 1,000 adults required for delisting were considered paired, resulting in 500 breeding pairs in both northern and southern Guam. Using breeding pairs, instead of adults, also helps address the second recovery criteria for a stable or increasing population and the third criteria for sufficient habitat to support territories and home ranges.

Using data from Pohnpei subspecies of the Micronesian sihek, each breeding sihek pair requires 20 ac (8 ha) of habitat (Kesler and Haig 2007a) and we have assumed that all juveniles occur within adult territories. Therefore, under ideal conditions 10,000 ac (4,047 ha) of habitat will be needed to support a stable sihek population with 500 breeding pairs and associated juveniles in both northern and southern Guam, where the breeding pairs are using 100 percent of the habitat throughout the year, the habitat is in ideal condition to support sihek, and there is never any loss of habitat due to manmade or natural disturbances such as fires or storms. These ideal conditions are unrealistic and not sustainable. Consequently, additional area is needed for a more realistic estimate of sihek habitat, as follows.

2. *Habitat Condition Correction Factor.* Density estimates for sihek in undeveloped areas of Guam give an average density of 4 ac (2 ha) per bird (adults and juveniles; 0.61 sihek per hectare). This density estimate includes breeding territories and areas that may not be of sufficient quality to support a breeding pair, but are an integral part of the sihek habitat, allowing for natural disturbances such as storm, tree falls, landslides, etc. This density estimate accounts for differences in sihek habitat condition on Guam compared to sihek habitat conditions on Pohnpei (see Baseline Acreage Estimate above) where habitat structure and composition can differ (Mueller-Dombois and Fosberg 1998, pp. 269–275, 288–291).

As noted earlier (see Survival and Recovery Needs above), a sihek population with a stable age distribution and 1,000 adult sihek would consist of approximately 1,616 juveniles. Therefore, 38.24 percent of a population with a stable age distribution would be adults ($1,000 \text{ adults} \div 2,616 \text{ individuals in the population} = 38.24 \text{ percent}$). Thus the total habitat needed to support 2,616 birds (500 breeding pairs and 1,616 juveniles) accounting for variability in habitat condition is estimated to be 10,464 ac ($2,616 * 4 = 10,464$).

3. *Catastrophic Event Correction Factor.* The 10,464 ac (4,235 ha) supports the minimum number of breeding sihek needed to reach recovery and does not provide for natural population fluctuations below the recovery numbers caused by catastrophic events. For instance, an increase in the frequency, intensity, and duration of typhoons, by several percent over the next 100 years, is expected to occur in the Mariana Islands (Emanuel et al. 2008, p. 360); this will likely increase fluctuations in the sihek population. To prevent the sihek population from fluctuating below the population numbers and growth rate needed for recovery, additional habitat is required for protection against current and future severe storms. Severe storms (strong - category 3 and above - typhoons and super- typhoons) currently affect Guam once a year on average (FWS analysis of the Joint Typhoon Warning Center best track data 1975–2014). Climate modeling indicates that these storms will increase in the future. A single severe storm can affect habitat, survival, and reproduction. A 10 percent increase in breeding pairs (50 pairs) would require an additional 262 birds (50 pairs and 162 juveniles) based on 38.24% of the population being adult birds. Thus the total habitat needed to support the additional 262 birds is estimated to be 1,048 ac ($262 * 4 = 1,048$) of habitat will serve as added protection against population fluctuations due to typhoons and other stochastic natural and manmade events.

4. *Final Acreage Estimate.* The area needed to support a viable northern sihek subpopulation that maintains itself above the minimum recovery threshold is estimated to be 11,512 ac (10,464 ac + 1,048 ac). This minimum area assumes that the habitat is restored and managed as follows: restoration of sihek habitat requires establishing land cover to 55 percent forested that support trees greater than 17 inches in diameter, and 45 percent open or low cover areas for foraging; management of sihek habitat requires the continual control of invasive plants, ungulates, non-native predators such as the brown treesnake, rats, and cats, as well as protection from fire. These restoration and management activities have never been fully demonstrated in Guam and so their success remains an assumption. Predator, weed and ungulate control activities can be very difficult in open wilderness terrain where access and monitoring are difficult. Because of this uncertainty in restoration and management of sihek habitat, additional habitat beyond the 11,512 ac (4,659 ha) may be required to achieve the recovery of sihek in northern Guam.

Estimated Amount of Habitat Needed to Support Sihek Survival and Recovery

Based on the above analysis, the final area needed to support a viable sihek population that maintains itself above the minimum population numbers necessary for recovery is estimated to be 11,512 ac (4,659 ha) for each sihek subpopulation in northern and southern Guam. Collectively, a total of 23,024 ac (9,317 ha) of habitat would be needed to support the survival and recovery of the sihek on Guam.

Summary of Remaining Habitat to Support the Survival and Recovery of Sihek in Guam

Northern Guam: Our thorough GIS analysis in 2015 indicated there remained 15,089 ac (6,106 ha) and 13,314 ac (5,388 ha) of sihek habitat in northern and southern Guam, respectively. The Department of Defense and Service entered into two agreements to protect and/or manage habitat for sihek and other federally listed species in Guam. A 2020 Memorandum of Understanding between Joint Region Marianas and the FWS outlined a mutual understanding regarding the intentions and future considerations of a Department of Defense Readiness and Environmental Protection Integration Initiative to address conservation of upland vegetation communities for the sihek as well as other federally listed species in Guam. The 2015 *Biological Opinion on the Department of the Navy's relocation of U.S. Marine Corps from Okinawa to Guam and Associated Activities in Guam* (USFWS 2015) addressed the permanent removal of 1,334 ac of vegetation and a 2015 Memorandum of Agreement between the Department of the Navy and the FWS assured the conservation of the 4,817 ac (1,949 ha) of sihek habitat within the 5,234 ac MOA area on DOD lands in north Guam, as detailed below. Our GIS analysis of 2023 and 2024 satellite imagery indicates total loss of sihek habitat since the analysis we did for the 2010 and 2015 Relocation biological opinions is 976 ac (395 ha) and there is currently approximately 14,113 ac (5,711 ha) of sihek habitat remaining in northern Guam. This is 2,601 ac (1,053 ha) more than the 11,512-ac (4,659-ha) necessary to support recovery of the sihek.

Southern Guam: Southern Guam was historically dominated by native ravine forest but human-caused wildfires have converted much of that forest to grassland (Minton 2006, p. 23-30; Greenlee 2010, entire); by 2020, the area of ravine forest was reduced by more than 50 percent due to human-caused fires (Mcamacho Fejeran 2021 in litt., p. 22). Although the rate of forest

conversion to grassland has been high, our GIS analysis of 2023 and 2024 satellite imagery indicates 13,241 ac (5,358 ha) of sihek habitat remain in southern Guam. This is 1,729 ac (700 ha) above the 11,512-ac (4,659-ha) minimum area needed to support recovery of the sihek.

Management of sihek habitat requires the continual control of invasive plants, ungulates, non-native predators such as brown treesnakes, rats, and cats, as well as protection from fire. Each subpopulation must have brown treesnakes and other predators controlled to a level where establishment of a sustainable sihek population is feasible and habitat to support this population level must be protected and managed. Typhoon intensity is expected to increase. We do not have a good way to estimate the impact on kingfishers except to expect that stronger storms will likely lead to more downed trees and potential loss of kingfisher breeding habitat (i.e., tree cavities, arboreal termitaria and fern clumps, etc.). Therefore, the 10% increase in breeding pairs (#4, above) is based on best professional judgement and can be altered as needed when data becomes available.

In the interim, efforts to introduce sihek to Palmyra and possibly other islands outside their native range are intended to reduce the detrimental consequences of long-term captivity and to limit the risk from stochastic events. Although any population(s) established on other islands outside of the sihek historical range would be considered temporary and would not contribute toward the recovery goal of two subpopulations of 1,000 adults each in Guam, the ability to translocate wild birds versus captive birds to Guam would increase success of their recovery and survival in Guam. The recovery of the sihek is dependent on having adequate protected habitat with threats managed in Guam to provide for the two subpopulations.

Current Conservation Actions for Sihek

Under the MOA, the DON works cooperatively with the Service to identify, develop and implement specific management activities and projects on the 5,234 ac (2118 ha) to support the following: 1) brown treesnake control and suppression to facilitate the larger goal of suppressing snake population levels that will ultimately support sihek survival and recovery; 2) support for brown treesnake control and eradication methods development, focusing on tools and techniques needed for landscape level survival and recovery of the sihek; 3) ungulate fencing and eradication; 4) control of small mammalian predators; 5) invasive plant control and eradication; 6) native plant restoration; and, 7) localized control of introduced invertebrates that may negatively impact sihek nesting/fledging. The DON has funded and initiated a number of projects to support the seven focal activities identified above. The DON will continue these activities with items (2) and (3) prioritized for continued funding (DON and USFWS 2015, p. 3). The level of funding for these activities may vary depending on the activities to be implemented each year but not exceeding \$2 million annually for the first ten years (starting in fiscal year 2016) (DON and USFWS 2015, pp. 4–5). Upon the expiration of the ten-year period, the DON and Service will reassess the progress of recovery efforts pursuant to the MOA.

As of 2023, 2,286 ac (925 ha) of native forest in Guam have been fenced by DOD to exclude ungulates and ungulates have been removed from approximately 65 percent of these areas (Burt pers. comm. 2023; Kedziora pers comm. 2023; Loerzel pers comm. 2023; Mizerek pers. comm., 2023). Ungulate removal has been implemented pursuant to the 2017 Reinitiation of the 2015 Biological Opinion for the Department of the Navy's Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam (USFWS 2017, p. 40) within the 600-ac

(243-ha) ungulate-fenced area of the Mason Live-Fire Training Range Complex (Loerzel pers. comm. 2023).

In 2024, the Service introduced an experimental population of sihek at The Nature Conservancy's Cooper Island Nature Preserve and the Palmyra Atoll National Wildlife Refuge (USFWS 2023g). The introduction on Palmyra Atoll is outside the sihek's historical range. The USFWS and its Sihek Recovery Program partners transported nine Guam sihek to The Nature Conservancy's preserve and research station on Cooper Island at Palmyra Atoll on August 28, 2024. The introduction of sihek to Palmyra Atoll is not intended to be a permanent self-sustaining population; rather, it is intended to facilitate the gathering of information and analysis to optimize efforts for reestablishment of the species in Guam once brown treesnakes can be sufficiently controlled at a landscape scale. The introduction of sihek to Palmyra Atoll is also likely to help increase the global population of this extinct-in-the-wild species in advance of a reintroduction effort in Guam.

Priority Conservation Actions

In addition to the actions identified above, the Service has identified priority conservation actions for sihek that are necessary for their conservation and recovery (adapted from USFWS 2008; USFWS 2014b, p. 3).

- Maintain or increase genetic diversity in the captive sihek population by implementing management strategies to exploit the potential gene diversity in the captive populations at the DAWR and AZA facilities.
- Predator Monitoring and Control: Continue efforts to develop and refine brown treesnake control techniques and support small-scale and large-scale control and/or eradication efforts in Guam.
- Reintroduction / Translocation: Develop a reintroduction plan for the sihek in Guam and set aside and protect recovery areas to facilitate its de-listing as soon as possible following the reintroduction of the sihek in Guam.
Protection and restoration of sihek habitat, including permanent protection as conservation areas and exclusion of brown treesnakes, ungulates, little fire ants, and other invasive species to levels needed to conserve the sihek.

Environmental Baseline – Sihek - Status of Sihek in the Action Area

Sihek are extirpated from the action area; however, habitat suitable for the survival and recovery of the species is present (Figure 14).

The Memorandum of Agreement (MOA) between the DON and the USFWS regarding conservation of the sihek habitat in northern Guam was signed by both parties on June 11, 2015. The purpose of the MOA is to ensure that a sufficient amount of suitable habitat is conserved and managed in accordance with Federal agency obligations under section 7(a) of the ESA in northern Guam to support the reintroduction of the sihek and to ensure that the DON meet the purpose and need for the proposed action to relocate the USMC to Guam (DON and USFWS 2015c, p. 1). The MOA commitment provides for the protection and management of a 5,234 ac (2,188 ha) area, within which there are 4,817 ac (1,949 ha) of sihek habitat. These 4,817 ac (1,949 ha) represent approximately 41% of the 11,512 ac (4,659 ha) of north Guam habitat that will be needed to support the recovery of the species (500 pairs in northern Guam).

Under the MOA, the DON works cooperatively with the USFWS to identify, develop and implement specific management activities and projects on the 5,234 acres to support the following: 1) brown treesnake control and suppression to facilitate the larger goal of suppressing snake population levels that will ultimately support sihek survival and recovery; 2) support for brown treesnake control and eradication methods development, focusing on tools and techniques needed for landscape level survival and recovery of the sihek; 3) ungulate fencing and eradication; 4) control of small mammalian predators; 5) invasive plant control and eradication; 6) native plant restoration; and, 7) localized control of introduced invertebrates that may negatively impact sihek nesting/fledging. The DON has funded and initiated a number of projects to support the seven focal activities identified above. The DON will continue these activities with items (2) and (3) prioritized for continued funding (DON and USFWS 2015a, p. 3).

The level of funding for these activities may vary depending on the activities to be implemented in a given year but not exceeding \$2 million annually for the first ten years (starting in fiscal year 2016) (DON and USFWS 2015a, pp. 4–5). Upon the expiration of the ten-year period, the DON and USFWS will reassess the progress of recovery efforts pursuant to the MOA.

Implementation of the Relocation project resulted in less sihek habitat removal than anticipated. Our GIS analysis of 2023 and 2024 satellite imagery indicates there are currently 14,113 ac (5,711 ha) of sihek habitat remaining in northern Guam. In the *Biological Opinion for Relocation and Reconstruction of Structures, Facilities, and Associated Infrastructure at Guam National Wildlife Refuge, Ritidian Unit* (USFWS 2025), we address the future removal of up to 10.75 ac (4.35 ha) of sihek habitat, leaving 14,102 ac (5,707 ha) remaining. This is 2,590 ac (1048 ha) more than the 11,512-ac (4,659-ha) necessary to support recovery of the sihek.

The footprints of the proposed construction at North Ramp and MSA-1 do not overlap with any area of the MOA lands. The proposed conservation actions at the Tarague forest enhancement area are within the lands already under conservation status pursuant to the MOA.

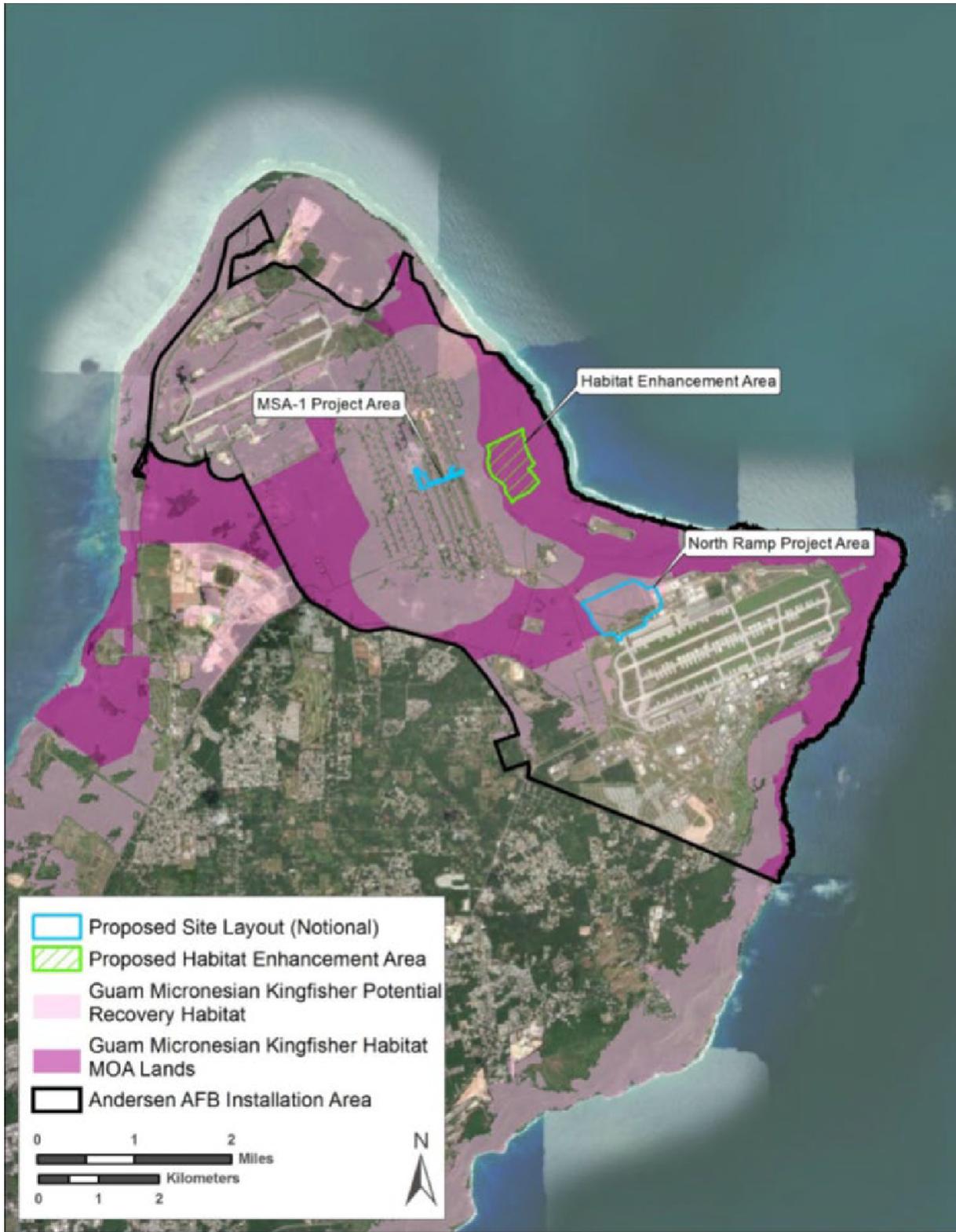


Figure 14. Remaining sihek habitat and MOA lands in the vicinity of the proposed action, white polygons, overlaid by the habitat layer, are project footprints from other, previous, projects (from PACAF 2024b, p. 3).

Status of the Åga

Species Description

The åga was listed as endangered throughout its range in 1984 and critical habitat was designated in Guam and Rota (USFWS 1984, pp. 33881–33885; 2004, pp. 62944–62990). This species is known historically only from the islands of Rota and Guam but is now extirpated from Guam. Preliminary genetic studies indicate that the Rota population is most likely a genetic subset of the Guam population (Tarr and Fleischer 1999, p. 946).

Life History

Åga are omnivorous, and their diet includes a wide variety of plants and animals, including insect larvae, centipedes, grasshoppers, mole crickets, praying mantis, earwigs, hermit crabs, skinks, geckos, and bird eggs (Jenkins 1983, p. 26, 31; Ha and Ha 2010a, pp. 8–10; Faegre *in press*). Faegre (*in press*) observed 619 food captures from approximately 36 wild åga and found that 14 percent of food captures were of plant-based foods, and 86 percent were from animal prey; 65 percent of animal prey were of insects or their larvae.

Åga use forested habitats including limestone, strand, ravine, agricultural forests, and secondary forests (Jenkins 1983, p. 25, 32). However, evidence suggests they are most abundant in native limestone forests and nests are found exclusively in native trees (Morton et al. 1999, p. 13, 33). Nesting occurs in closed canopy forests in trees that are on average 17 cm in diameter at breast height, 8.7 m high, and 290m from roads (Morton et al. 1999, p. 32). Breeding likely occurs all year on Rota, while peak nesting activity generally occurs between August and February (Morton et al. 1999, p. 12).

Population Dynamics

Little is known regarding lifespan, age of sexual maturity, and length of fertility of åga. The oldest known wild åga was at least 18 years old when last observed on Rota in 2014 (A. Kroner and S. Faegre, University of Washington, pers. comm. 2014). This same adult male was at least 17 years old when he was last seen feeding a fledgling in 2013. Another male was 14 years old when he last produced a chick in 2009, and a 15-year-old female was observed with a fledgling in 2014 (S. Faegre, University of Washington, pers. comm. 2014). Although it was originally thought that åga begin breeding around 3.5 years old (Morton et al. 1999, p. 2), a radio-tagged male åga built his first nest at 16 months of age and was observed feeding a fledgling at 21 months of age.

Åga are known to be susceptible to disturbance from human activities with a recommended 984 ft (300-m) radius for a buffer zone around active åga nests based on observations of åga reacting to facility/grounds maintenance, brown treesnake trapping, research activities, loud music, and human voices (Morton 1996, entire). One åga nest in Guam was abandoned due to disturbance from maintenance activity and from radio noise coming from a sound system 492 ft (150 m) away (Morton 1996, p. 62). Ha et al. (2011, p. 236) found that nest sites were always greater than

984 ft (300 m) from any buildings, and that actual nest sites were almost twice as far from roads and buildings as random sites.

Ha et al. (2010, p. 335) detected first-year mortality had declined from 70% to 40% over a ten-year period and disease is an ongoing cause of mortality (Cortes-Rodriguez 2019, p. 187). Åga telemetry studies have been ongoing since 2009. As of 2013, nine recently-deceased, radio-tagged åga had been found with evidence suggesting cat predation, and one untagged adult was taken in for care and later died after receiving what a veterinarian confirmed as an infected cat bite (Ha et al. 2013, pp. 5–6).

As detailed in USFWS 2020d (pp. 4–5):

“From 2012-2019, the primary cause of death in crows of all age classes has been an inflammatory syndrome of unknown origin. Among 25 crow carcasses that were submitted for necropsy, 20 had deaths attributed to this syndrome. This inflammatory disease has been called Åga Eucaryote X (AEX) by Dr. Thierry Work at the USGS Hawaii Field Station. Dr. Work suspects that AEX is an infectious disease; AEX causes illness and death through systemic inflammation, anemia, and pneumonia. Efforts to identify the organism associated with this disease have not been successful and investigations are ongoing through both USGS and San Diego Zoo Global (Sarah Faegre, Rota Avian Behavior Ecology Project, pers. comm. 2020).”

Status and Distribution

Guam

Although the åga was once present throughout Guam (Baker 1951, p. 246), the population began declining in the 1960's (Engbring and Ramsey 1984, p. 30; Engbring et al. 1986, p. 92) and is now extirpated. The last known åga of Guam origin was observed in 2001, and the last known wild åga that was captive-reared from Rota and released in Guam was observed in 2012. Predation by brown treesnakes is the overriding factor in the extirpation of åga from Guam. Suitable habitat for åga is still present in Guam. As described below in the Environmental Baseline for the åga, we estimate that 24,919 ac (10,084 ha) of åga habitat is left in Guam. More information on åga habitat is provided in the Environmental Baseline for the åga section below.

Rota

In 1976, åga were considered relatively common and widely distributed on Rota (Pratt et al. 1979, p. 234). Reanalysis of the first island-wide survey for the species on Rota in 1982 using current density estimate methods resulted in a population estimate of 1,491 birds (815–3115 birds, 95 percent confidence interval) (Engbring et al. 1986, pp. 92–95). The most recent published information indicates there are 50–55 breeding pairs (Cortes-Rodriguez et al. 2019, p. 187). The primary threats to the åga on Rota are the introduction and spread of the brown treesnake to that island, predation by feral cats (*Felis silvestris*), and habitat destruction (Cortes-Rodriguez et al. 2019, p. 2). Additionally, a newly documented inflammatory syndrome, known as AEX, is thought to be responsible for high juvenile mortality, thus impacting recruitment and population growth (Work 2022, *in litt.*)

In response to high juvenile mortality, a rear and release program was initiated in 2016. Under this program eggs are collected and brought into captivity and reared, allowing the pair to reneest, thereby potentially doubling their reproductive success. Since inception the rear and release program has achieved 95% hatch and fledge rates (ZSSD 2024a, *in litt.*), and has released 7 cohorts with high post-release survival, and are successfully breeding with wild åga (ZSSD 2024b, *in litt.*).

Survival and Recovery Needs of the Åga:

For purposes of this consultation, the survival need of åga in the wild is assumed to be the reproduction, numbers, and distribution of åga necessary to support a persistent population on Rota and Guam assuming the on-going protection of the ESA. However, as åga are currently extirpated from Guam, for Guam we focus on the recovery needs of åga (which would also provide for their survival once reintroduced to Guam). For purposes of this consultation, the recovery needs of åga is the reproduction, numbers, and distribution of åga on Rota and Guam assuming the threats to the species have been addressed such that the protections of the ESA are no longer necessary, i.e., the species does not meet the definition of a threatened or endangered species. Below we describe our assessment of the reproduction, numbers, and distribution of åga needed for recovery as a means of assessing the effects of the proposed action on the collective survival and recovery of åga.

The delisting criteria from the draft revised recovery plan for the åga calls for a minimum of 225 territorial breeding pairs (75 on Rota, 75 in northern Guam, and 75 in southern Guam), with all three populations stable or increasing, and habitat conditions and threat management are sufficient to achieve and maintain these populations (USFWS 2006, p. v).

Since the draft revised recovery plan was published in 2005, additional work on population viability of the åga has occurred. This recent assessment of population viability indicated that 75 territorial breeding pairs may not be viable over the long-term due to potential inbreeding depression and projected increases in tropical storm intensity, duration, and frequency, and that 100 territorial breeding pairs may be a more appropriate recovery target for each population (USFWS 2014, p. 7).

Åga Habitat Necessary for Recovery

Survival and recovery of the åga has required the establishment of a rear and release program on Rota, effective biosecurity to prevent the brown treesnake from being spread to Rota, and maintaining and restoring habitat needed to support the species on Guam. Successful recovery of åga is dependent on protecting a sufficient amount of habitat within the åga historical range to support three subpopulations on Rota and Guam.

In December 2014, we conducted a detailed habitat assessment for the åga on Guam (USFWS 2014). Our goals were to: 1) to identify lands suitable for reintroduction of the species; 2) to determine how much habitat was needed to support recovery of the species. The methods used to calculate åga habitat are provided below.

The long-term stability of åga populations is dependent on the availability of suitable breeding habitat and successful reproduction. Typhoons are a regular occurrence on Guam and Rota and

are expected to affect the availability of suitable nesting sites and overall nesting success. Unfortunately, estimates of typhoon damage to nesting trees and demographic estimates of typhoon impacts on åga breeding success are limited. This assessment should be reconsidered when these data become available. In the interim, we (USFWS 2014, entire) use estimates of habitat requirements and delineation of habitat areas (see below) to help account for some of these effects.

Estimated Population Size and Area Needed for Recovery

1. We used 100 territorial breeding pairs as our recovery target for this assessment for each of the three regions identified above. A sustainable population of territorial pairs requires a floater population of juvenile and pre-breeding åga to replace any pair members that die. We utilized demographic information from the Rota population (Morton et al. 1999, Ha et al. 2010, Zarones et al. 2014) to estimate a stable age distribution using statistical analysis. We then used this distribution to determine the number of non-breeders needed to support the breeding population. Based on this analysis, an additional 96 adult åga (males and females), 54 juveniles and 42 pre-breeders, would be needed to support a breeding population of 100 territorial pairs at each of the three areas described above. We assumed that each of these birds would require space for foraging and roosting.
2. *Density Estimates:* Morton et al. (1999, p. 2) reported that åga territories ranged from 29.65 to 91.43 ac on Rota, with a mean territory size of 54.36 ac. Therefore, we utilized 54.36 ac as our estimate of forested habitat needed to support a breeding pair. Home range estimates for non-breeders were not available, and we do not currently have information on åga territory overlap. Therefore, we assumed that each bird would need approximately half a territory, 27.18 ac (11 ha).
3. *Delineation of Åga Habitat on Guam:* As noted in the Status of the Species, åga are more likely to occur in native dominated forest. For this assessment, we assumed that all areas identified as limestone and ravine forests on the 2006 Forest Service landcover maps of Guam and Rota (Liu and Fisher 2006a,b) are potential åga habitat. We then updated the amount of available habitat on Guam by removing all forested areas cleared since the landcover map was completed using 2011 satellite imagery of Guam. We then subdivided the remaining forested areas into potential and non-potential habitat based on forest patch area and isolation. We identified forest areas that were sufficiently large to support an åga territory using a “territory building” algorithm that we developed using the Raster package in the statistical program R. This algorithm accounted for the size of the territory and suitability of habitat, thereby omitting areas that were insufficient in size to meet the criteria of an åga territory. We then classified forest patches as too isolated for åga habitat if they were of insufficient size to hold three or more territories and if they were greater than 2 mi (3.5 km) (the maximum dispersal distance for the åga on Rota) from the nearest neighboring patch of forest capable of supporting three or more territorial pairs.
4. Utilizing the recovery targets for the species and density information, approximately 5,436 ac (2,200 ha) of forest is needed to support 100 territorial breeding pairs. In addition, 2,609 ac (1056 ha) of forested habitat would be needed to support the non-

breeding åga population. Therefore, a total of 8,046 ac (3,256 ha) of forest habitat would be needed at each of the three regions (Rota, northern Guam, and southern Guam) to support the survival and recovery of the åga. However, the 8,046 ac (3,256 ha) supports the minimum number of breeding åga needed for survival and recovery of åga in the wild and does not provide for natural population fluctuations. For instance, increased damage from storms in the Mariana Islands would likely increase the fluctuation of the northern Guam åga population and increase the acres of suitable habitat needed for the survival and recovery of the åga.

5. To account for åga population fluctuations, additional habitat is required for protection against current and future severe storms. Severe storms (strong [category 3 and above] typhoons and super-typhoons) currently affect Guam every five to 10 years (USFWS analysis of the Joint Typhoon Warning Center best track data 1975–2014). Climate modeling indicates that these storms will increase in the future. A single severe storm can significantly affect survival and reproduction in that breeding season. A 10 percent increase in breeding pairs (10 pairs) requiring an additional 544 acres of habitat will serve as added protection against population fluctuations due to stochastic natural and anthropogenic disturbance.

Estimated Amount of Habitat Needed to Support Åga Survival and Recovery

Based on the above analysis, the final area needed to support a sustained åga population that supports the conservation and recovery of the species is estimated to be 8,590 ac (3,476 ha) for each åga subpopulation. Collectively, the three subpopulations would need a total of 25,770 ac (10,428 ha) of habitat would be needed to support the survival and recovery of åga. It is important to note, the habitat model does not account for differences in habitat quality. As described above, primary limestone forest is the highest quality habitat for the åga. Secondary limestone forest is of lower quality, but due to data mapping challenges, is counted equally in the habitat model. Given the current threats from military and civilian development, typhoons, invasive species, ungulates, and forest conversion, and the small amount protected habitat, it is imperative that conservation efforts begin to protect and enhance the quality of åga habitat on Guam

Summary of Remaining Habitat to Support the Survival and Recovery of Åga on Guam

In a thorough GIS assessment in 2014, an estimated 13,962 ac (5,650 ha) of potential åga habitat remained in northern Guam and 10,957 ac (4,434 ha) of åga habitat remaining in southern Guam. The relocation BO (2015) addressed the permanent removal of 1,332 ac (539 ha) of åga habitat in northern Guam. Åga habitat overlaps with sihek habitat and is more limited in extent. Because our GIS analysis of sihek habitat loss, as detailed above, indicates 976 ac (395 ha) of åga habitat has been cleared recently due to the various preceding federal and private actions, we conclude no more than 976 ac (395 ha) of åga habitat have been removed. In the *Biological Opinion for Relocation and Reconstruction of Structures, Facilities, and Associated Infrastructure at Guam National Wildlife Refuge, Ritidian Unit* (USFWS 2025), we address the future removal of up to 10.75 ac (4.35 ha) of åga habitat. Therefore, 12,975 ac (5,251 ha) of åga habitat remains in northern Guam, which is 4,385 ac (1,774 ha) more than the 8,590 ac (3,476 ha) necessary to support the recovery needs of the species in northern Guam.

Threat Management

In addition to lands being set aside for conservation, åga habitat needs to be managed for threats including brown treesnakes and other predators, invasive species, and ungulates. Most of the lands set aside for conservation are not currently managed to reduce threats. Therefore, it is urgent that habitat protection and management of Guam's forests begin immediately to prepare for the reintroduction, and potential recovery, of extirpated avian species. If åga habitat is degraded to such an extent that it no longer provides the ecological functions necessary to support åga (for example, loss of native trees necessary for åga breeding and foraging), then this habitat will need to be removed from baseline calculations.

Current Conservation Efforts for Åga

Management and recovery actions that have occurred on Rota (USFWS 2020e, pp. 3–5) include:

- Establishment of a rear and release program
- Banding to develop age-specific survivorship models
- Nest monitoring for analyses of nesting success and demographics
- Åga mortality monitoring
- Habitat and natural process management and restoration
- Human interaction monitoring and management
- Predator monitoring and control
- Release of rehabilitated åga
- Strategic planning / threats management planning

Management and recovery actions that have occurred on Guam include:

As of 2023, 925 hectares (2,286 acres) of native forest in Guam have been fenced by DOD to exclude ungulates and ungulates have been removed from approximately 65 percent of these areas (Burt pers. comm. 2023; Kedziora pers comm. 2023; Loerzel pers comm. 2023; Mizerek pers. comm., 2023). Ungulate removal is being implemented pursuant to the 2017 Reinitiation of the 2015 Biological Opinion for the Department of the Navy's Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam (USFWS 2017, p. 40) within the 600-ac (243-ha) ungulate-fenced area of the Mason Live-Fire Training Range Complex (Loerzel pers. comm. 2023).

Since 2014, the USDA-APHIS Wildlife Services, in coordination with the National Wildlife Research Center, the DOD, and the Department of Interior-Office of Insular Affairs, have been developing and testing aerial application of a brown treesnake toxicant (acetaminophen) over forested areas in AAFB inform future improvements to the method and efficiency of the delivery of the acetaminophen and other baits to snakes in Guam.

Although the MOA between the DON and the USFWS regarding conservation of the sihek habitat in northern Guam was intended to support the conservation and recovery of that species, the commitment to land protection and the conservation actions funded through MOA benefit a range of listed species, including åga. In particular, the work being conducted under the MOA to further develop and implement measures to control brown treesnakes is crucially important to the long-term ability to reintroduce åga to Guam and support species recovery needs.

Recovery actions still needed to prevent the extinction of the Åga from Rota:

- Research and implementation of effective biosecurity to reduce the threat of the brown treesnake becoming established on Rota
- Implement priority actions identified in the åga SDM exercise, including predator control and continuation and expansion of the current rear and release program
- Identify and manage sources of adult and juvenile mortality
- Improve public perception of the åga to reduce potential human persecution
- Protect important habitat

Recovery actions needed to allow the reintroduction of the Åga to Guam:

- Develop and implement large-scale, long-term methods for brown treesnake control that will reduce the brown treesnake population on a landscape level
- Protect and restore åga habitat in northern and southern Guam in-perpetuity protection as conservation areas
- Continue management of the existing ungulate exclosures (i.e., at Northwest Field, the HMU, and Marine Corps Base Camp Blaz)
- Expand rear and release efforts to increase the population size by expanding facility capacity
- Continue and expand ungulate control and the creation of ungulate free areas across remaining åga habitat
- Conserve native forests through invasive species monitoring and control

Environmental Baseline – Åga

Åga are extirpated from the action area; however, habitat potentially suitable for the survival and recovery of the species (Figure 15) is present across much of the northern Guam action area.

The footprint of the proposed action does not overlap with any of the conservation lands identified under the MOA. The project footprints at the airfield and the MSA-1 will remove portions of the remaining habitat for the three extirpated species. The conservation actions at the Tarague forest enhancement area are within the lands identified for conservation within the MOA.



Figure 15. Remaining åga habitat in the project vicinity (habitat has been cleared previously in areas underlaid by white) (from PACAF 2024, p. 9)

Status of the Ko'ko'

Species Description

The ko'ko' was listed as endangered in Guam in 1984 (USFWS 1984, pp. 2485-2488). An experimental, nonessential population of ko'ko' occurs on Rota. The ko'ko' on Rota are treated as threatened species, rather than as endangered species, for the purposes of sections 4(d) and 9 of the ESA (USFWS 1989, pp. 43966-43970).

The ko'ko' is endemic to the island of Guam in the Mariana Islands. The ko'ko' is extirpated in the wild in Guam but persists in captivity at the Guam DAWR facility and twelve U.S. mainland zoos (AZA 2014, p. 1). Efforts to establish a nonessential experimental population on the island of Rota have been underway since 1989. The establishment of a wild population on Rota will ensure that a source wild population is available for future repatriation of ko'ko' to Guam when brown treesnakes have been controlled or eradicated in Guam (USFWS 1989, p. 43967). On Islan Dãno' (a small islet approximately 1.6 km (1 mi) off the southern coast of Guam), breeding pairs of ko'ko' have become established in a predator-controlled habitat through efforts associated with a Safe Harbor Agreement and activities permitted under section 10(a)(1)(A) of the ESA (USFWS 2008b; USFWS 2008c, p. 1–2). This agreement, signed in 2008, allowed for the establishment of ko'ko' on private land owned and managed by Islan Dãno' Resort and public land owned by the Government of Guam and managed by the Guam Department of Parks and Recreation. The ko'ko' are monitored to learn more about survivorship, breeding behavior, habitat preference and nesting success.

Life History

The ko'ko' formally occurred in most habitat types in Guam, including forest, savanna, secondary grassland, agricultural areas, mown grass bordering scrub communities, mixed woodland and scrub, and fern thickets (Jenkins 1979, p. 405–406; Taylor 1998, p. 259). ko'ko' were predominantly observed using scrubby secondary growth area and the edges of mixed forest areas (Jenkins 1979, Engbring and Ramsey 1984). Jenkins (1979) reports that they were seldom observed in the interior of mature limestone forests or savanna areas and did not occur in wetlands. As Guam was probably mostly limestone forest before the arrival of humans (Forsberg 1960), the rail may have become more common after much of the mature forest had been converted to scrubby second-grown or mixed forest (Engbring and Ramsey 1984).

The diet of the ko'ko' is comprised of snails, slugs, lizards, insects, and vegetable matter such as seeds and palm leaves; the rail feeds on food items from the surface of the ground, especially snails and slugs after rain showers (Jenkins 1979, pp. 405–406). They chase low-flying insects and feed on seeds and flowers from low grasses and shrubs, stretching up to reach items 40 cm above the ground. They often forage along edge habitat but seldom venture far from cover (Jenkins 1979, p. 404; Taylor 1998, p. 259).

In captivity, ko'ko' can live up to 17 years, while females can reach 16 years old. Median life expectancy for captive males is 9.5 years; captive female median life expectancy is slightly lower at 5.7 years (AZA 2014, p. 5). The median life expectancy of ko'ko' in the wild is unknown. Both males and females can begin reproducing at approximately 5 months old. Males

have bred until the age of 11, and females as old as 9 years old have successfully reproduced. Breeding in captivity is complex, as males can be extremely aggressive and have at times injured or killed females. In captivity, clutch sizes range from one to six eggs, averaging 2.1 eggs, with an incubation period of 19 days.

Status and Distribution

Ko'ko' were once distributed throughout Guam (USFWS 1990c, p. 7). They first disappeared from southern Guam in the early 1970's (Jenkins 1979). In 1981, the population was reduced to approximately 2,300 individuals and only existed in northern Guam (Engbring and Ramsey 1984, p. 28). In 1983, estimates of the population size indicated that fewer than 100 individuals remained in Guam and 22 individuals were moved to captive propagation facilities (Haig and Ballou 1995, p. 446). The rail was extirpated in Guam by 1987 (Wiles et. al. 1995, p. 38).

There have been two releases of ko'ko' in Guam since this species has been listed as endangered. In 1998, 16 ko'ko' were released in "Area 50" at AAFB in northern Guam (Beauprez and Brock 1999). A temporary brown treesnake barrier was constructed around Area 50 and snake populations in the barrier were reduced through snake control. Breeding was documented, although the small population was extirpated by predators, mainly feral cats. In 2003, a second release of 44 ko'ko' occurred in a brown treesnake-reduced area of the MSA on AAFB. Efforts to reduce cat predation on the ko'ko' were limited due to difficulty in obtaining approval to control cats in the area. By 2008, ko'ko' no longer were present in the MSA.

On Rota, over 800 captive-bred ko'ko' were released between 1989 and 2008 in an effort to establish an experimental wild population (Beck 1991). The introduction to the island of Rota, which is outside the historical range of the species, was necessary because primary habitat in Guam had been altered through the establishment of the introduced, predatory brown treesnake. Population estimates are shown in Figure 7. Released birds suffer mortality primarily due to feral cat predation, which slows population establishment. Current release strategies include intensive cat trapping and a review and update of monitoring protocol for ko'ko' on Rota.

On Islan Dãno' (Cocos Island), sixteen captive bred ko'ko' were released in November 2010. Prior to the release, rats (*Rattus* spp.) were eradicated on Islan Dãno'. Ko'ko' are successfully breeding (16 nests and 12 chicks have been observed) on Islan Dãno'. This population is vulnerable to brown treesnakes, which were initially documented as present on the island in 2020. Although efforts are being made to control brown treesnake on Islan Dãno', eradication will require significant resources and a coordinated efforts between the Service, the Guam Department of Agriculture, the private landowner, and conservation partners.

As detailed in the 2020 5-year review for the species (USFWS 2020e, p. 2)

"The ko'ko' currently consists of three populations, one in captivity one experimental population Rota Island, and a population on Cocos Island established through a Safe Harbor Agreement. As of 2019, 116 birds were maintained in captivity by the Guam Department of Agriculture, Division of Aquatic & Wildlife (DAWR). The population on Cocos was estimated at 24 birds in 2018 and the population is actively breeding. Of 16 birds trapped in 2019, 10 were unbanded. The population appears to be stable, but not growing, as estimates in 2015 were 28-30 birds. On Rota, 200 birds were estimated based

on call back surveys conducted in 2019, which is an increase over previous estimates, which ranged from 110 birds in 2016 and 2018 to 148 birds in 2015 (Laura Duenas DAWR, pers. comm. 2024; DAWR 2016, 2017, 2018, 2019, 2020)” (Figure 16).

Fiscal Year	Captive: DAWR*	Cocos Island (Safe Harbor)**	Rota (experimental)**
2015	Not available	No survey (delayed survey estimated 28-30 birds)	Estimated 136-148 birds
2016	Not available	Estimated 16 birds.	Estimated 110 birds
2017	Not available	No full census. However 6 birds were banded and fitted with radio transmitters.	No estimate
2018	102 birds	24 birds estimated based on call back survey.	Estimated 110 birds
2019	116 birds	No full census. However, 16 birds were trapped; 6 recaptures and 10 new.	Estimated 200 birds

*Data from Laura Duenas DAWR, pers. comm. 2020
 ** Data from DAWR (2016, 2017, 2018, 2019, 2020)

Figure 16. Population summaries from USFWS 2020e, p. 2.

Threats (adapted from USFWS 2020e, p. 2–5):

Loss or degradation of habitat due to predation and human disturbance and typhoons:

- Agricultural and urban development is a factor in habitat loss and degradation in Guam.
- Nonnative brown treesnake predation: the brown treesnake continues to limit efforts to reestablish ko’ko’ in Guam and Islan Dãno’ and the movement of the snake to Rota is a risk for the avifauna of that island.
- Cat predation: feral cats continue to limit efforts to reestablish ko’ko’ in Guam and impact the ko’ko’ experimental population on Rota.
- Rodent predation: because rats have been eradicated and are absent from Islan Dãno’, there is continued efforts to prevent the reintroduction of rats to this island. Rats can negatively impact ko’ko’ by consuming eggs and preying on chicks.
- Stochastic events: although birds in the Mariana Islands have evolved with typhoons, typhoons in concert with low population numbers, habitat loss, and behavioral and genetic consequences of captive breeding could negatively affect the recovery of the ko’ko’.

Survival and Recovery Needs

For purposes of this consultation, the survival need of ko’ko’ in the wild is assumed to be the reproduction, numbers, and distribution of ko’ko’ necessary to support a persistent population on Guam assuming the on-going protection of the ESA. However, as ko’ko’ are currently extirpated from mainland Guam (i.e., not surviving on Guam), for Guam we focus on the recovery needs of

ko'ko' (which would also provide for their survival once restored to Guam). For purposes of this consultation, the recovery needs of ko'ko' is the reproduction, numbers, and distribution of ko'ko' on Guam assuming the threats to the species have been addressed such that the protections of the ESA are no longer necessary, i.e., the species does not meet the definition of a threatened or endangered species. Below we describe our assessment of the reproduction, numbers, and distribution of ko'ko' needed for recovery as a means of assessing the effects of the proposed action on the collective survival and recovery of ko'ko'.

Downlisting criteria for ko'ko is defined as reintroduction and conservation of 1,000 birds to northern Guam and 1,000 birds to southern Guam (total of 2,000 individuals; USFWS 1990, p. 33) and brown treesnakes would need to be controlled to such an extent that reintroduction and survival of the species can be achieved (USFWS 1990, p. 33–34). No criteria were defined for delisting; however, Traill et al. (2009) proposed a minimum population target of 5,000 individuals as an appropriate target for species conservation.

Habitat Needed to Support Ko'ko' Recovery

Survival and recovery of the sihek has required maintaining a population in captivity and establishing an experimental 10(j) population on Rota while threats from the brown treesnake are addressed in Guam. Successful recovery of ko'ko' is dependent on protecting enough habitat within the ko'ko' historical range to support two subpopulations of ko'ko' upon reintroduction to northern and southern Guam.

In December 2014, we conducted detailed habitat assessment for the ko'ko' in Guam (USFWS 2014). Our goals were to: 1) to identify lands suitable for reintroduction of the species; 2) to determine how much habitat was needed to support recovery of the species. The methods used to calculate ko'ko' habitat are provided below.

Density Estimates

Engbring and Ramsey (1984) estimated ko'ko' densities 0.07 to 0.33 birds per ha in Guam in 1981. The weka (*Gallirallus australis*), another rail species of conservation concern, had densities ranging from 0.3 to 0.8 birds per ha (Beauchamp 1987) while the Cocos buff-banded rail (*Gallirallus philippensis andrewsi*) typically had densities from four to nine birds per ha (Reid and Hill 2005). The rail and weka densities both reflect species undergoing population declines. Therefore, their density estimates may not reflect the potential densities that could be obtained from a recovered population. However, because the maximum ko'ko' density does overlap with the weka estimates it serves as an estimate of potential densities until further data are collected. Therefore, to meet the population goal of 5,000 individuals in Guam we would need 41,184 ac (16,667 ha) (5,000 birds/0.3 birds per ha) of appropriate habitat in Guam. In addition, to meet the downlisting criteria of 1,000 birds in both northern and southern Guam then 8,236 ac (3,333 ha) (1,000 birds/0.3 birds per ha) of appropriate habitat would be needed in both northern and southern Guam.

Identification of Habitat Necessary for Recovery of Ko'ko'

Ko'ko' were predominately observed using scrubby secondary growth areas and the edges of mixed forest areas (Jenkins 1979, Engbring and Ramsey 1984). Jenkins (1979) reports that they were seldom observed in the interior of mature limestone forests or savanna areas and did not

occur in wetlands. The Forest Service vegetation map of Guam includes the following vegetation types: 1) Limestone Forest, 2) Ravine Forest, 3) Palma Brava Grove, 4) Scrub Forest, 5) Leucaena Stand, 6) Casuarina Thicket, 7) Acacia Plantation, 8) Coconut Plantation, 9) Savanna Complex, 10) Strand Vegetation, 11) Other Shrubs and Grasses, 12) Agricultural Field, 13) Urban Builtup, 14) Urban Cultivated, 15) Barren Land, and 16) Wetlands (Liu and Fischer 2006a). Of these vegetation types, only Scrub Forest, Other Shrubs and Grasses, and Urban Cultivated were considered primary ko'ko' habitats because they include shrubby edge habitats. The remaining forested areas were excluded because ko'ko' were less common in interior forested areas. Ko'ko' are thought to use the edges of these vegetation types, however, these areas are likely bordered by secondary scrub, shrub, and urban cultivated vegetation types which are included. Savanna complex also was not included though they may use the edge of this habitat types. Wetlands and barren lands were not included because the available data does not list these vegetation types being used by the birds. Ko'ko' may use agricultural fields however there was no data available indicating they use these areas. Finally, Urban Builtup was excluded because ko'ko' were not reported in urban areas and these areas likely do not contain appropriate habitat for the species.

In addition to vegetation type, patch size and proximity or distance between patches also were considered in the delineation of habitat for the ko'ko'. No information is available on the average size of a ko'ko' territory. A related species, Lord Howe woodhens (*Gallirallus sylvestris*) have an average territory size of one to four ha (NSW National Parks and Wildlife Service 2002) while the weka (*Gallirallus australis*) have an average territory size of two or five ha depending on location (Beuchamp 1989). If we assume the maximum territory of a ko'ko' is similar to the weka then any patch less than 10 ha (the average territory size of two weka pairs [5 ha x 2]) and over one kilometer away from the nearest patch is likely too small and isolated to be viable habitat for ko'ko' recovery. In addition, all patches less than one ha (the minimum territory size of a Lord Howe woodhen) and 410 ft (125 m) (the approximate radius of a five-ha territory) from the nearest patch above one ha is considered too isolated and small to be viable habitat for ko'ko' recovery. Finally, any patch less than 24.7 ac (10 ha) and completely isolated by the nearest patch by lands classified as Urban Builtup (excluding roads) by the Forest Service is considered too isolated to be viable ko'ko' habitat due to the potential for urban developed areas to impede movement of ko'ko'.

Estimated Amount of Habitat Needed to Support Ko'ko' Survival and Recovery

Based on the density information, the population goal of 5,000 individuals in Guam, and the above analysis, an estimated 41,184 ac (16,667 ha) (5,000 birds/0.3 birds per ha) of appropriate habitat on Guam would be needed to support the survival and recovery of ko'ko'. To achieve the downlisting criteria of 1,000 birds in both northern and southern Guam, an estimated 8,236 ac (3,333 ha) (1,000 birds/0.3 birds per ha) of appropriate habitat would be needed in both northern and southern Guam.

Remaining Habitat that can Support Recovery on Guam

Based on the above, in 2010, there was approximately 24,698 ac (9,995 ha) and 24,886 ac (10,063 ha) of habitat in northern and southern Guam, respectively, for the ko'ko'. However, very little of this habitat is protected for the conservation of the ko'ko'. No habitat in southern Guam is protected by a permanent conservation mechanism. Although the Guam Department of

Parks and Recreation approximately one third of Islan Dãno' (Cocos Island) and management in support of ko'ko' recovery is conducted by DAWR, the remaining two thirds of the island is private land. Coordinated land protection and management with the private landowner is necessary to provide for the long-term survival of ko'ko' on Islan Dãno'.

Although the MOA between the DON and the USFWS regarding conservation of the sihek habitat in northern Guam was intended to support the conservation and recovery of that species, the identification of lands protected and the conservation actions funded through MOA benefit a range of listed species, including the ko'ko'. In particular, the work being conducted under the MOA to further develop and implement measures to control brown treesnakes is particularly important to the long-term ability to reintroduce ko'ko' to Guam and support species recovery needs.

Priority Conservation Actions for Ko'ko'

In addition to the actions identified above, the USFWS has identified priority conservation actions for sihek that are necessary for their conservation and recovery (adapted from USFWS 2020e).

- Predator monitoring and control: Continue efforts on Guam to develop and implement measures to control the brown treesnake at ports of entry, including at the town of Merizo, the departure point for Cocos Island, and on military lands. Rodents on Cocos Island should be monitored and controlled to support the survival and expansion of the experimental rail population on the island. Implementing large-scale feral cat control and eradication efforts on Guam should occur prior to and in conjunction with any reintroduction efforts.
- Radio transmitter tracking: Conduct radio tracking of the ko'ko' on Cocos Island to determine home range, nesting, and survival. Further analysis is needed to determine how home range sizes change as the ko'ko' population increases and during breeding.
- Habitat protection: Permanently secure and manage new fenced areas on Guam and Rota and the immediately surrounding buffer habitat. Manage vegetation at buffer areas and at captive breeding pens to preventing impacts from invasive species, such as the little fire ant.

Environmental Baseline of the Ko'ko'

Ko'ko' are extirpated from the action area; however, habitat potentially suitable for the survival and recovery of the species is present across much of the northern Guam action area (Figure 17).

The footprint of the proposed action does not overlap with any of the conservation lands identified under the MOA. The project footprints at the airfield and the MSA-1 will remove habitat for the three extirpated species. The conservation actions at the Tarague forest enhancement area are within the lands identified for conservation within the MOA.



Figure 17. Remaining ko'ko' habitat in the project vicinity (habitat has been previously cleared from areas underlain with white) (from PACAF 2024, p. 9)

Effects of the Action

General Effects of the Action to All Species

Permanent Vegetation Removal

The BA indicates the following: “The Proposed Action has the potential to affect ESA-listed species through the removal of available habitat for these species. The proposed construction would remove vegetation from 209 ac. The largest vegetation type within the construction footprint, the limestone degraded forest, contains a mixture of native and non-native vegetation consistent with similar forests throughout Andersen AFB and northern Guam. Within the 209-acre construction footprint at both the North Ramp and MSA-1, more than 150.7 acres of vegetated land, including 127.7 ac of limestone native and degraded forest, would have all plants removed.” Table 9 details vegetation within the project construction footprints.

Table 9. Summary of vegetation within project construction footprints (BA, Table 1).

Table 1. Vegetation Communities Impacted within the North Ramp and MSA-1 Construction Footprints Relative to Andersen AFB Vegetation Type/Land Cover	Construction Footprint	Acres	% of Construction Footprint	% of Construction Footprint Acres on Andersen AFBa
Limestone Degraded Forest	North Ramp	127.2	66.5	3.9
Limestone Native Forest	North Ramp	0.4	<1.0	<0.1
Other Shrub/Grassland	North Ramp	15.9	8.3	1.8
Developed Land	North Ramp	47.9	25.0	1.0
Total	North Ramp	191.4	100.0	1.2
Vitex Forest	MSA-1	7.1	42.0	<0.1
Limestone Degraded Forest	MSA-1	0.1	0.3	<0.1
Developed Land	MSA-1	9.8	57.7	0.2
Total	MSA-1	17.0	100.0	<0.1

Plant and animal habitat will be permanently cleared for construction of the new facilities including buildings, roadways, and parking facilities.

- A buffer area of 492 ft (150 m) surrounding the North Ramp and MSA-1 construction footprints will be surveyed prior to commencement of project work and work will not commence if a fanihi roost is within this buffer. This buffer applies to fanihi roosts and approximately encompasses the sound field resulting from noise produced by the operation of construction equipment or maintenance activities as well as the area that could be illuminated by security lighting.
- An area at Tarague totaling approximately 151 ac (61 ha), will be established as a forest enhancement area. This area will be fenced and ungulate (pig and deer)-free and would be used for transplanting of native tree species propagated from seed collected primarily from the North Ramp and MSA-1 construction footprints. This area may also be used for transplant and transplanting of ESA-listed plant species. No previous management actions have occurred within the forest enhancement area, and this area is adjacent to existing conservation areas currently being maintained by Andersen AFB and it is within

the lands delineated for conservation within the MOA (detailed below). The final size and shape of the established Tarague forest enhancement area might differ from that shown in as a result of fencing avoiding steep topography and other obstacles.

- An approximately 1-ac (0.4 ha) area of mixed limestone forest within the Habitat Management Unit (HMU) that would be used for used for transplant of salvaged ESA- listed orchids.

Transportation Risk of Habitat Degradation due to Invasive Species

Habitat degradation may result from the accidental spread of the little fire ant or other invasive species from aircraft and vehicle points of origin and transit to project sites. This risk is avoided via implementation of the installation's ongoing biosecurity protocols.

Effects of the Action to Fanihi

The project will result in the permanent removal of forest habitat used by transiting and foraging bats. Additionally, fanihi are vulnerable at their day roost when startled or alarmed by disturbance, including noise. While the specific response of a fanihi to disturbance may vary, disturbed fanihi are likely to experience a stress response and take flight to move away from the disturbance. Fanihi show a strong tendency for roost site fidelity, often returning to the same roost tree year after year to raise pups. However, prolonged or severe disturbance can result in abandonment of the roost location. Unavoidable project aircraft noise may result in dispersal of the fanihi currently using the Station 67 area of Pati Point. Habitat enhancement at the Forest Enhancement Area at Tarague basin is intended to increase habitat suitability for fanihi in northern Guam by sustaining an area of habitat with reduced threats where the bats may persist, long-term.

Permanent loss of habitat

The proposed action will result in the permanent removal of 141 ac (57 ha) of habitat used by fanihi for transiting and foraging North Ramp and MSA-1 footprint. Fanihi do not currently use the project footprint as a roost, although the Pati Point Station 67 colony location is approximately 700 ft (225 m) from the North Ramp and MSA-1 footprint.

Noise disturbance

Fanihi in the action area will be exposed to an approximately 32 percent increase in the number of instances of noise from aircraft takeoffs, landings, and other operations at North Ramp. Currently, approximately 7,475 takeoffs and landings occur annually (averaging 20 takeoffs and 20 landings, per day) and the project would result in an annual future 9,883 takeoffs and landings (an increase to an average of 27 takeoffs and 27 landings, per day). Aircraft sound pressure from aircraft operations will be highest near the airfield (Figure 18), attenuating with distance.

Audible and low-frequency sound from project aircraft, construction equipment, vehicles, and outdoor personnel activities are expected to intermittently affect fanihi in north Guam. The decibel (dB) is measured on a logarithmic scale and its values are referred to generally as "sound levels." A sound level of 0 dB is approximately the lower threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as

discomfort, and sound levels ranging from 130 to 140 dB are toward the upper threshold and are felt as pain (Berglund & Lindvall 1995, cited in ManTech International, Inc. 2024, p. 3–2; OSHA 2011, p. 7).

All sounds have a spectral content, which means their magnitude or level changes with frequency, where frequency is measured in cycles per second or Hz. To mimic the human ear's non-linear sensitivity and perception of different frequencies of sound, the spectral content is weighted. For example, environmental noise measurements are usually on an A-weighted scale, which places less weight on very low and very high frequencies in order to replicate human hearing sensitivity.

The general range of human hearing is from 20 to 20,000 Hz; humans hear best in the range of 1,000–4,000 Hz. Low-frequency sounds (0–20 Hz) produced by jet aircraft, rocket launches, earthquakes, volcanoes, big-wave surf, whales, elephants, and other sources such as would be expected to occur during the proposed missile launch, travel long distances with little attenuation. A-weighting is a frequency-dependent adjustment of sound level used to approximate the natural range and sensitivity of the human auditory system. As terrestrial wildlife species, including fanihi, generally have a similar hearing range as humans. A fanihi is unlikely to be close aircraft to be exposed to the 120 dB sound levels that could injure a bat, but project-related audible and low-frequency sound exceeding 60 decibels is likely to be perceived by the fanihi over the northern Guam landscape during aircraft takeoffs and landings.

The fanihi is likely to be sensitive to this aircraft noise. Exposure to a 60 dB sound at any frequency may elicit physiological responses in animals (Awbrey and Hunsaker 1997; Mock and Tavares 1997; Delaney et al. 1999; Rand et al. 2011, p. 361; Walker et al. 2012 Appendix C, pp. 35–36; Bednarz 2021, pp. 323–328; Alves et al. 2020, pp. 4–23). Because the listed vertebrates are likely to rely on audible and vibration signals for predator detection, unfamiliar noise is expected to elicit vigilance and sleep disturbance in these animals.

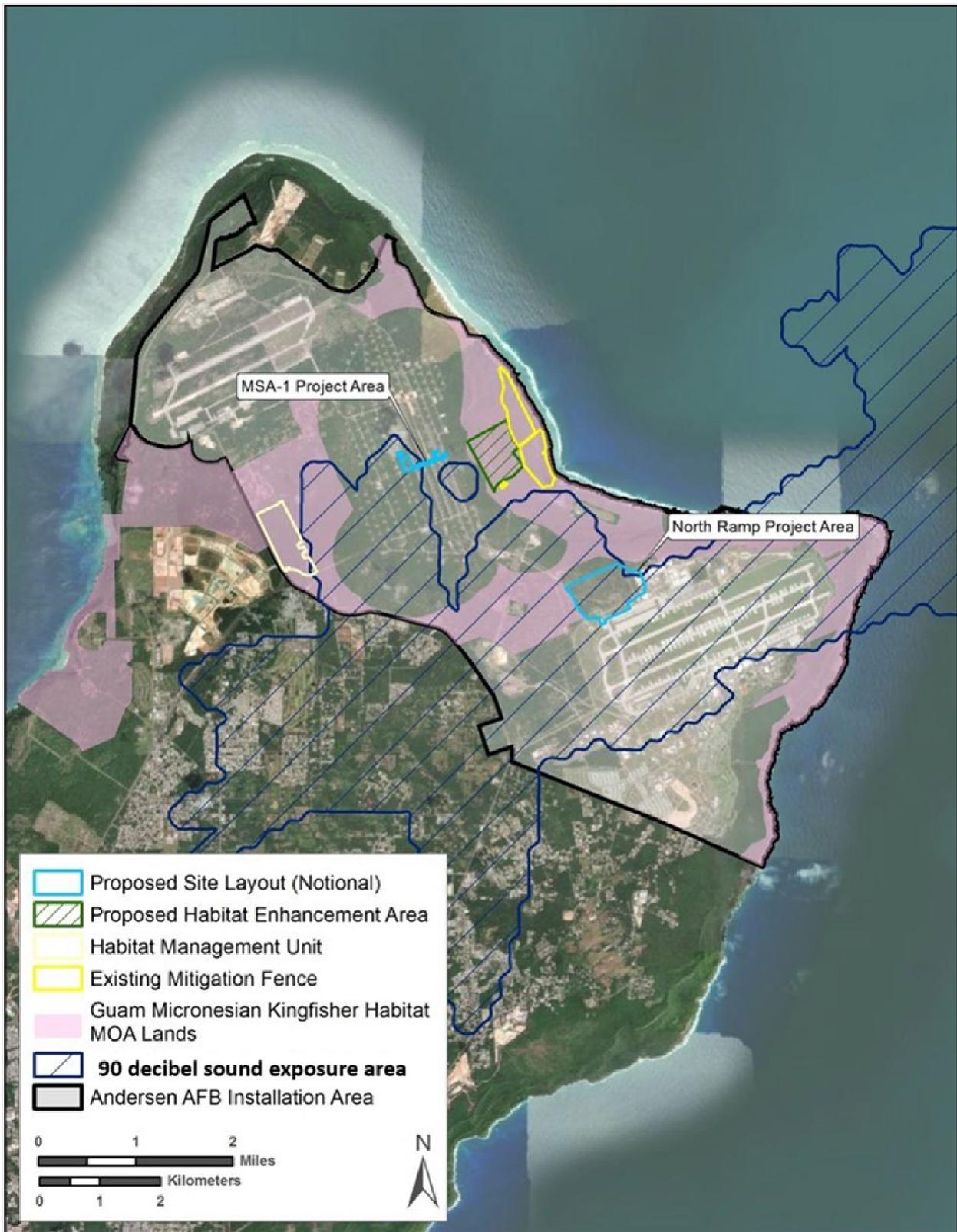


Figure 18. Project sites and areas where project aircraft acoustical events greater than 90 decibels may increase in frequency.

The low-frequency sound information provided in the BA, (p. 54) indicates the 0.1 to 10 hz sound pressure levels from idling and taxiing by various types of aircraft would be approximately 60-80 decibels. The decibel level is expected to be much higher during takeoffs. This sound, in excess of 60 decibels, may be sensed by the bats if it is not distinguished audibly. Aircraft takeoffs may produce levels of sound pressure that would result in detectable vibration of structures such as plants and animals in the flightline vicinity. The BA provides the following assessment of aircraft noise impacts to the species (p. 49):

“Effects from Operations and Maintenance. For aircraft operations at the North Ramp, the reasonably expected upper-bound sound levels for aircraft operations (i.e., idling, taxiing) are depicted on Figure 14. These sound levels represent the loudest aircraft at Andersen AFB (F-35) as if it were operating on the edge of and perpendicular to the North Ramp boundary, facing directly away (idle-out) or directly toward (idle-in) the North Ramp.

Noise levels from idling and taxiing at the Station 67 roost area would range from 35 to 88 dBA under the Proposed Action. These noise levels would be lower than those from existing takeoffs on the nearby runway, which generate noise levels between 89 and 104 dBA, and would generally be lower than those from existing landings, which generate noise levels between 64 and 89 dBA. Noise levels depicted on Figure 14 would be expected to be lower for quieter aircraft as well as for aircraft not operating at the edge of and perpendicular to the North Ramp boundary.

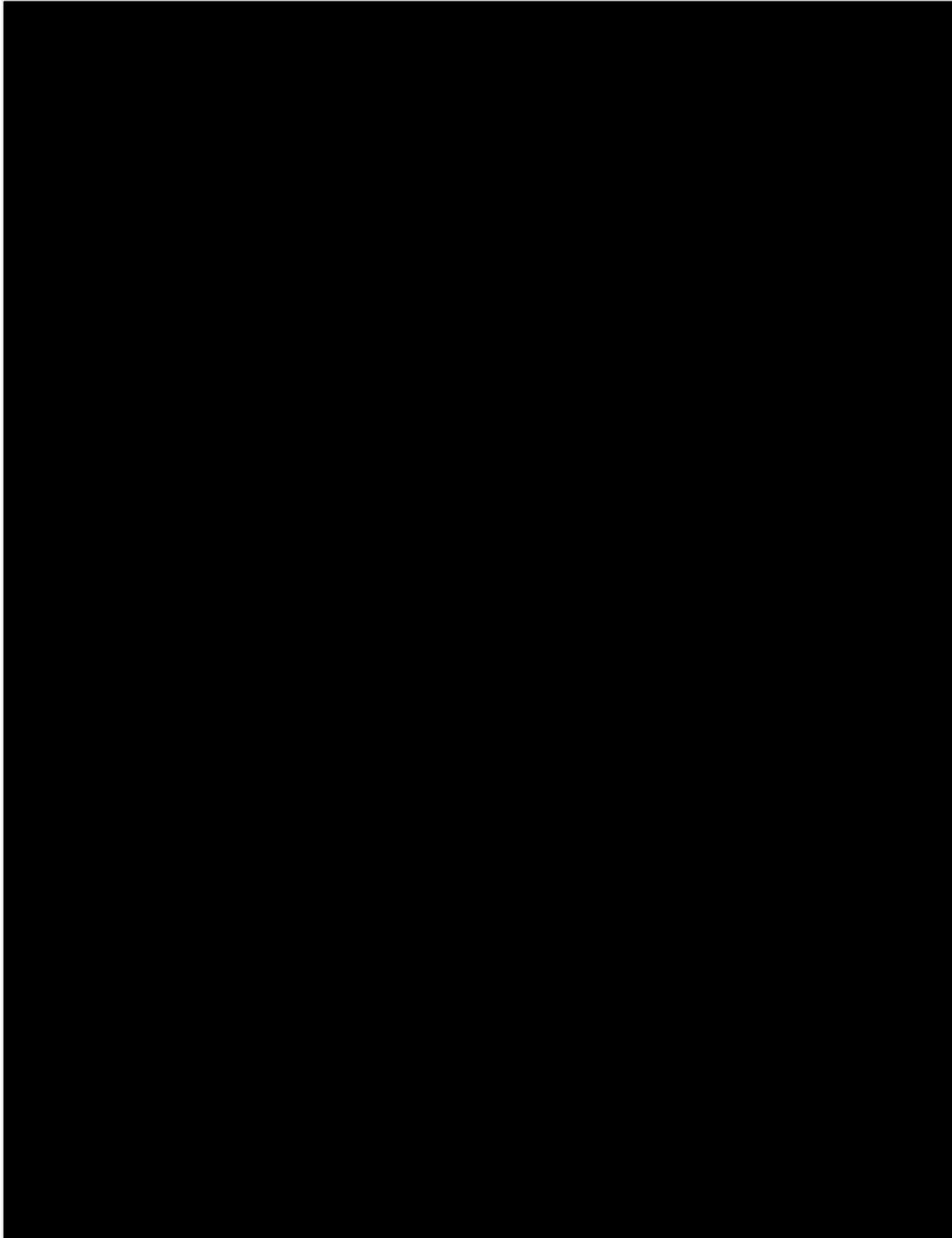
The duration of the noise exposure for the site preparation, construction, and operations elements of the Proposed Action would be longer than aircraft overflights and would occur over multiple hours for multiple days. [The BA] outlines the approximate times that the known roosting area would be exposed to direct noise levels from operations compared to existing conditions.

The amount of time the [Station 67] roosting area would be exposed to 60 dBA would increase from 32 to 43 minutes per day, to 70 dBA from 5 to 10 minutes per day, and to 80 dBA from 0.5 to 1 minute per day. These approximations reasonably assume an even distribution of idling and taxiing on the North Ramp from north to south (i.e., the same amount near the northern edge as near the southern edge), a constant taxi speed, and the aircraft either being pointed directly toward (idle-out) or directly away (idle-in) from the known roosting area.”

The proposed increase in aircraft idling and taxiing activity in close proximity to the fanihi colony and the increase in high levels of audible (Figure 19) and low-frequency sound produced by aircraft takeoffs and landings may result in the abandonment of the established colony of fanihi at “Station 67”. As detailed in the BA (p. 55):

“Increased noise levels can result in unnecessary expenditure of energy as well as stress-related behaviors (SWCA 2008) or flushing from the roosting area (SWCA 2012). Fruit bats show a high level of fidelity to colonies unless disturbed (USFWS 2016). When colonies are disturbed, fruit bats may be negatively affected in a variety of ways, including, but not limited to, destruction of social structures, disruption of energetic and

hormonal balance, forced relocation to lower quality habitat, abandonment of young, and disruption of breeding (Wingfield et al. 1998, Heideman 2000, Klose et al. 2006, and CNMI 2010 as cited in USFWS 2016). Exposure to construction-, operations-, or traffic-related noise may result in roosting area abandonment if intolerance to noise levels results in increased stress levels.”



The SWCA (2008, p. 31) research summarized the following stress responses of the bats that historically occupied the Pati Point area, prior to the bats abandoning (see Figure 6) and then recently recolonizing (see Figure 9) the Pati Point vicinity:

“Mariana fruit bats were observed reacting to aircraft overflights on some occasions but not others. There were no instances of complete colony flushing or abandonment. Colony flushing was expected to be at least 15 percent, based on Morton’s (1996) results, but the current study found flushing episodes were infrequent at less than 5 percent for overflights louder than 75 dBC and 6 percent for overflights louder than 100 dBC. In a previous study, up to 42 percent of the Mariana fruit bat colony flushed in response to aircraft overflights (Morton 1996). In both the current study and previous studies (Grout 1993, Morton 1996), individuals were in flight for a relatively short period (<10 minutes) and generally resettled prior to the commencement of the next scan. Flush rates, thus, may not adequately reflect species sensitivity to human disturbance and should only be used as a management guide in conjunction with other indices such as spatial distribution (Peters and Obis 2006). Almost 60 percent of all flush events were from aircraft that departed from the north, rather than the south runway. In all instances where more than one bat flushed, aircraft had departed from the north runway. There are a number of reasons why we would detect a difference in flushing frequency between the north and south runways. First, the northern runway was closer (approximately 750 meters) to the fruit bat colony than the southern runway (approximately 1000 meters). This could result in aircraft flying over the colony at a lower altitude than southern runway departures, and 2) aircraft departing from the north runway are more likely to fly directly over the fruit bat colony.

Disturbance by overflights is not an ‘all or nothing’ response. Severe reactions such as panic or escape behavior (i.e., flushing) may not be observed in a colony, but that does not mean that individuals are physiologically undisturbed by the overflight. Mild responses such as slight changes in body position may occur but be overlooked as inconsequential. Further, researchers have concluded that one of the primary direct effects to wildlife by noise is expected hearing loss (Krausmann et al., 2004). We have no way to gauge the possibility of hearing loss to the Guam fruit bat colony. Other responses, such as elevated heart rate, cannot be observed but have been demonstrated to be affected by low altitude overflights (MacArthur et al., 1982; Workman et al., 1992a, b, c; Harms et al., 1997; Krausman et al., 1998). Previous research has demonstrated that disturbance can be cumulative; low level disturbance can lead to chronic stress. Without the use of an internal heart rate transmitter (Harms et al., 1997, Krausman et al., 1998), physiological effects of aircraft overflights on Mariana fruit bats cannot be determined. Additionally, alertness or changes in body position may unknowingly occur during individual scans of the colony but are unnoticed because the bat that may have exhibited this behavior was not the focal bat during the scan (i.e., the behavior was missed by the observer while another bat was under observation).”

Vehicle / Traffic Impacts

Fanihi are expected to avoid project vehicle traffic because bats are sensitive to traffic noise (Bednarz 2021, p. 323). The BA characterizes project construction traffic as follows:

“Traffic associated with construction assumes that the North Ramp and MSA-1 construction footprints would require a workforce of 500 construction workers, with an average of 2 construction workers per vehicle traveling to and from the installation daily, resulting in an additional 250 vehicle roundtrips to the construction footprints. Additionally, it is assumed there would be 1 vehicle for delivery of material for every 25 workers daily (20 total vehicles).

It is anticipated that construction traffic would continue to access the construction footprint via Marianas Boulevard, directly into the construction footprint; however, general base traffic would be routed northwestward around the North Ramp construction footprint on 5th Street. Based on the existing volume of traffic on Marianas Boulevard, it is anticipated that up to 1,064 daily trips could be re-routed onto 5th Street to within 2,600 ft (792 m) of the known roosting area. During operations, general base traffic would occur along the proposed new road along the northern perimeter of the North Ramp, [REDACTED]. Long-term increases in the noise environment from traffic would occur, and additional information on expected noise levels from traffic. Little is known about the effects of increased traffic noise and vehicle presence on roosting bats.

While increased human presence associated with construction and operations is not anticipated outside the construction footprint, those adjacent habitats may still see a decline in foraging.”

Light Impacts at Night

Increased lighting within construction footprint from security and safety lighting on equipment. New outdoor lighting installed on facilities would be hooded and designed to provide the lighting levels required in the Unified Facilities Criteria, while minimizing disruptions to fanihi roosting.

Beneficial Effects of the Forest Enhancement Area to Fanihi

Designation of the 151-ac Forest Enhancement Area at Tarague and implementation of conservation actions described in the project description will increase the habitat quality and suitability for fanihi, thus contributing to conservation and recovery needs of the species on Guam. Conservation efforts will fence and remove ungulates, control little fire ants, outplant native fruiting trees, and otherwise manage the site in way that supports the habitat needs for fanihi. This site is contiguous with existing ungulate-free conservation areas and is anticipated to provide an area of lower disturbance for roosting fanihi. The low-frequency inaudible sound and the audible sound from existing and project-related additional aircraft sound, not exceeding 90 dB, will affect fanihi at the Forest Enhancement Area and they will experience unavoidable sleep disturbance and alert behaviors, but at a much lower intensity than the areas near the airfield. We expect the Forest Enhancement Area will continue to remain suitable for roosting and sheltering

during the proposed construction and aircraft operations. It is anticipated this Forest Enhancement Area will contribute to the continued needs of the species on Guam by creating the conditions that support fanihi feeding, breeding and sheltering into the future.

Summary

All fanihi in the action area will be exposed to project noise from construction, aircraft operations and other human activity. As previously detailed, Figure 18 delineates the areas of the landscape that will experience the highest levels of low-frequency and audible aircraft sound. Due to aircraft sounds in excess of 90 dB, the areas nearest the runways will be less desirable for roosting activities. Although aircraft operations similar to those proposed were already occurring at the airfield when the Station 67, Pati Point, colony was re-established, the increased noise from construction in closer proximity to the roost, and the future increased jet aircraft noise, will increase the number of times these bats are affected by high decibel sound. Therefore, we anticipate the increased noise in North Ramp and MSA-1 footprint will result in a subset of fanihi experiencing stress responses. Habitat in the immediate vicinity of the North Ramp footprint, including the current location of the fanihi colony at Pati Point Station 67, is expected to be degraded by aircraft noise to such an extent as it may no longer be suitable for breeding or sheltering, likely resulting in some or all the fanihi currently using this colony location dispersing to other location(s) in northern Guam. There is variation in the number of fanihi that will be present at the Pati Point Station 67 location at the time of project construction and the start of the operations. However, for the purposes of this consultation, we assume the fanihi numbers using the Pati Point Station 67 colony location to remain approximately 70-214 bats (see Figure 5). Therefore, up to 214 fanihi may be experience a stress response to such an extent they permanently abandon their current colony roost location. We expect that some fanihi that disperse from the Pati Point Station 67 location will experience reduced reproductive potential until a new colony roost(s) is established.

High-noise areas (Figure 18), including the area of the Pati Point Station 67 site, are likely to continue to provide transiting and foraging habitat (fanihi are not likely to avoid the area as a result of disturbance).

Fanihi that disperse from the Pati Point Station 67 location are expected to move to nearby conservation areas in northern Guam on DoD-managed conservation lands, such as the Tarague Forest Enhancement Area, where there is less noise and other human disturbance. Project implementation of invasive species suppression and native forest conservation at the 151-ac (61 ha) Tarague Forest Enhancement Area is expected to provide a long-term relatively attractive forest site to conserve future fanihi foraging and roosting activity. Designation and management of the 151-ac (61 ha) Forest Enhancement Area will assure a relatively attractive area for fanihi roosting and foraging on Guam.

The overall distribution of the species is not expected to be reduced (since we expect fanihi to continue to be present in similar numbers across Guam and continue to transit over and forage in this area); however, the action is expected to result in a localized permanent loss of habitat suitable for roosting and breeding within the noisiest areas, including the current location of the Pati Point Station 67 colony. This permanent loss of forest habitat is not expected to appreciably reduce the survival of fanihi on Guam or the ability for the species to recover in the wild. The

establishment of the Forest Enhancement Area at Tarague is expected to minimize the effect this localized reduction in distribution by enhancing the habitat needed to support feeding, breeding and sheltering.

Effects of the Action to *Cycas micronesica*

The project will implement a three-pronged approach to conserve *Cycas micronesica* to boost the wild population to remain at or above what it would have been in the absence of the proposed action. The first prong of the project's conservation action entails fencing and ungulate removal, in perpetuity, of the 151-ac (61 ha) Tarague forest enhancement area. This action alone will increase natural recruitment of *C. micronesica* in this area. Second, *C. micronesica* will be propagated and outplanted to the Tarague forest enhancement area, and all wild plants at that site will be annually treated to control the cycad *Aulacaspis* scale. There will be a short-term reduction in the total number of adult reproductive *C. micronesica* in the population. However, there were no seedlings detected in surveys, indicating recruitment is not occurring in the proposed project construction areas.

Cycas micronesica propagules will be collected from within the project footprints and, if needed to meet plant conservation target numbers, from other sites on AAFB and propagated plants will be out planted to the Tarague forest enhancement area. By propagating and outplanting *C. micronesica* and by annually treating the wild *C. micronesica* within the Tarague forest enhancement area. Since 2020, *Cycas micronesica* numbers may have declined by 30 percent, an annual rate of decline of 8.1 percent, in large part due to *Aulacaspis* scale insect impacts to adults and seedlings and ungulate browsing and trampling impacts to seedlings (USFWS 2024a p. 5). In 2024 surveys, the North Ramp and MSA-1 sites were occupied by 222 *C. micronesica*. In the absence of the proposed action, these 222 *C. micronesica* would be expected to decline at a rate of 5.8%, 8.1%, or if the current site surveys are an indication, 18.9% annually. For this project conservation action, the number of salvageable *C. micronesica* at the site in Year 1 will be used to determine the future year 5, 10, 15, and 20 number of live *C. micronesica* at the Tarague forest enhancement area as a result of the project's propagation effort (Table 10).

To meet these Year 5, 10, 15, and 20 check-points, additional propagule collection, propagation, and outplanting may need to be done. The benefits of this effort, in relation to the baseline number of plants that would have remained in the project footprints in these future years, in the absence of the action, is shown in Table 10. Assuming there are 146 salvageable *C. micronesica* within the project footprints in Year one, this outplanting portion of the conservation effort will result in the occurrence of 47 live *C. micronesica* at the Tarague forest enhancement area in project year 20, in comparison with the estimated 3 – 67 wild plants that would have remained alive in the construction footprints had no land clearing been done. Because the Tarague forest enhancement area will be ungulate-free, and annual treatment of *C. micronesica* will slow mortality due to invertebrates, there is no assurance the adult, reproducing plants in the project footprints would be replaced with adult reproducing plants. It is possible outplanted *C. micronesica* may experience high mortality rates, such that the living plants accounted for in years 5, 10, 15, and 20, are composed of juvenile replacement plants. It is possible the conservation management of the outplanted plants will result in their long-term survival so this

project may result in one of the only occurrences of successful recruitment of young plants to Guam’s aging population of *C. micronesica*.

Table 10. Number of Outplanted *Cycas micronesica* Compared with the “Baseline” Number Expected to have Remained alive in the Project Footprints in the Absence of the Proposed Action.

YEAR		5.8% Future Decline: Baseline - Actual (surveyed) and projected future number of Cycads expected to persist in the proposed development area in the absence of the proposed action, based on the 5.8% annual decline rate at the optimistic low end of our confidence interval	Project Conservation Outplanting: Minimum number of outplanted <i>Cycas micronesica</i> at the forest enhancement area, Tarague, in Years 5, 10, 15, and 20, will be based on XX (the number of "salvageable" <i>C. micronesica</i> in the project footprints in project year 1. Estimating there will still be 209 live <i>C. micronesica</i> in project Year 1, and estimating 74.6% of those will be found to be "salvageable", the placeholder XX in this example is 155. The subsequent years numbers reflect a 5.8% annual decline. Years 5, 10, 15, and 20 are highlighted to reflect the project's conservation commitment to ensure this number of propagated/outplanted <i>C. micronesica</i> are alive in the Tarague forest enhancement area in those years (tracking a 5.8% annual rate of decline in "salvageable" plants in the project footprint)	For Comparison: 8.1% Future Decline: Baseline - Actual (surveyed) and projected future number of Cycads expected to persist in the proposed development area in the absence of the proposed action based on an 8.1% annual rate of decline.	For Comparison: 18.9% Future Decline: Baseline - Actual (surveyed) and projected future number of Cycads expected to persist in the proposed development area in the absence of the proposed action based on a continued 18.9% annual rate of decline.
2021 Site Surveys	2021	416		416	416
	2022	(Note, between 2021 and 2024 surveys, project footprint <i>Cycas</i> numbers dropped 47%, an annual average rate of 18.9%)			
	2023				
2024 Site Surveys	2024	222		222	222
Year 1 Land Clearing	2025	1	209	<i>XX Expected to be Estimated 146</i>	
	2026	2	197	204	180
	2027	3	186	187	146
	2028	4	175	172	118
Year 5	2029	5	165	158	96
	2030	6	155	146	78
	2031	7	146	134	63
	2032	8	138	123	51
	2033	9	130	113	42
Year 10	2034	10	122	104	34
	2035	11	115	95	27
	2036	12	108	88	22
	2037	13	102	81	18
	2038	14	96	76	15
Year 15	2039	15	91	72	12
	2040	16	85	68	10
	2041	17	80	63	8
	2042	18	76	57	6
	2042	18	71	53	5
Year 20	2043	20	67	49	4
				45	4
				42	3

The third prong in the project’s *Cycas micronesica* conservation approach is that 1,219 wild *C. micronesica* within the forest enhancement area will be treated annually with a slow-release imidacloprid insecticide to treat cycad *Aulacaspis* scale for a duration of 20 years. We do not have an estimate of the increased survival rates, but this action is expected to be of considerable benefit to further securing the *C. micronesica* population.

Summary

In summary, we expect the three prongs of the project's *Cycas micronesica* conservation actions (ungulate removal, propagation and outplanting, and annual invertebrate control) will result in similar or better condition of *C. micronesica* species in Guam than would have occurred in the absence of the proposed action. There will be a short-term reduction in the total number of adult reproductive *C. micronesica* in the population. However, there were no seedlings detected in construction footprint surveys, indicating recruitment is not occurring. The ungulate fencing is expected to enable natural recruitment to the existing wild population at Tarague, the outplanting is expected to further boost the number of *C. micronesica* in the population, and the annual insecticide treatment of the 1,219 wild *C. micronesica* at the forest enhancement area is expected to boost survival of the remaining wild plants for 20 years. We expect reproduction to increase over what is currently documented as a result of both the ungulate fencing and the annual insecticide treatment of the wild *C. micronesica* plants at the forest enhancement area. Additionally, because recruitment in the wild is so limited, the introduction of young plants via propagation may increase the population's persistence by producing a new cohort of plants that would not have occurred but for the action. The proposed action will result or equal or greater species numbers and distribution than would have occurred in the absence of the project.

Effects of the Action to *Tabernaemontana rotensis*

Tabernaemontana rotensis habitat will be permanently lost within the project construction footprints as summarized in the general effects section above. The proposed conservation actions, including outplanting native plants and invasive plant and animal control will increase habitat quality for *T. rotensis* at the forest enhancement area. Forest degradation would have continued to occur due to ungulate and invasive plant impacts in the North Ramp project footprint, resulting in reduced recruitment and survival of these plants in their current location. Overall, the removal of ungulates from the forest enhancement area is a net benefit to the *T. rotensis* habitat.

At the time of groundbreaking (Year 1), the health and maturity of each of the *Tabernaemontana rotensis* within the project construction areas will be assessed to determine how many genetically unique individuals can potentially be salvaged through seed collection or cuttings. Based on the survey detections of 99 *T. rotensis*, in the project construction footprints, the project commits to propagate and outplant 99 *T. rotensis* at the forest enhancement area. This number of *T. rotensis* will be maintained: The project monitoring and conservation actions will ensure the number of *T. rotensis* outplants alive at the conservation site in project years 5, 10, 15, and 20. The proposed action will result or equal or greater species numbers and distribution than would have occurred in the absence of the project.

Summary

Although habitat for *Tabernaemontana rotensis* will be permanently removed in the project construction footprints, overall, the project will result in a net-benefit to habitat conservation for *T. rotensis* due to the proposed conservation of the forest enhancement area at Tarague. Additionally, propagation and outplanting of *T. rotensis* is expected to ensure there is no net loss of genetic diversity or numbers of mature *T. rotensis* in the wild. Overall, the project does not appreciably reduce the likelihood of the survival and recovery of *T. rotensis* in the wild.

Effects of the Action to the Three Orchid Species (*Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense*)

Orchid habitat will be permanently lost within the project construction footprints as summarized in the general effects section above. The proposed conservation actions, including outplanting native plants and invasive plant and animal control will increase habitat quality for orchids at the Forest Enhancement Area. Forest degradation would have continued to occur due to ungulate and invasive plant impacts in the North Ramp project footprint, resulting in reduced recruitment and survival of these plants in their current location. Overall, the removal of ungulates and other invasive species from the forest enhancement area is a net benefit to the *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense* habitat.

There are a small number of listed orchid individuals within the North Ramp project footprint. The BA's Supplemental Biological Survey Report (p. 23) indicates surveys in 2021 detected four *Bulbophyllum guamense* on three host trees. In 2024 surveys, only one dead *B. guamense* was detected in the project footprint at North Ramp. Two *Dendrobium guamense* individuals were found in the North Ramp project footprint. One hundred *Tuberolabium guamense* plants, growing on 19 host trees are known to be within the North Ramp project footprint. The number of adult orchids within the project footprints at the time of project "Year 1" will be put into conservation in the HMU forest conservation area. This will be accomplished via both translocation and propagation and outplanting. Orchids will be collected to ensure the offset of 100 percent of the mature individuals at the time of health assessment. Seeds may be collected from other locations on Andersen AFB and propagated and maintained in a nursery until deemed suitable for transplanting to meet replacement goals. Due to the small size and growth within tree canopies, undetected orchids may be removed with vegetation clearing. However, by putting into conservation the number of adult orchids detected within the project footprints, the orchids are likely to better contribute to the long-term conservation of the species. The proposed action will result or equal or greater species numbers and distribution than would have occurred in the absence of the project.

General Effects of the Action to the Extirpated Species:

The three species are not currently present in the action area; however, the proposed action will result in the permanent loss of 141 ac (57 ha) of the remaining sihek and åga habitat and 9 ac (4 ha) ko'ko' habitat in northern Guam. Therefore, effects of the action to individuals of the extirpated species are not expected until they are reintroduced to the wild on Guam. However, loss of habitat in the action area for these three species due to land clearing will result in adverse effects to each of the extirpated species by reducing the capacity for the landscape to provide demographic (breeding) and dispersal (recruitment) support and food resources necessary to support the recovery of the species. Establishment of the population sizes needed to support recovery of the three extirpated species will require sufficient availability of habitat.

Loss of habitat due to development is a considerable threat to the recovery of the three extirpated species. Below we summarize species-specific impacts of the action to the habitat that remains for these species.

Effects of the Action to Sihek

The sihek is currently extirpated from the wild and the timelines during which direct impacts to individuals due to project noise disturbance can't be accurately assessed. However, we have determined that the proposed project will adversely affect the sihek by removing habitat which, in the absence of the project, would have remained intact to provide for the feeding, breeding, and sheltering of this species once it is reintroduced. The proposed action will result in the permanent removal of 141 ac (57 ha) of sihek habitat. Our GIS analysis of 2023 and 2024 satellite imagery indicates there is currently 14,113 ac (5,711 ha) of sihek habitat remaining in northern Guam. In the *Biological Opinion for Relocation and Reconstruction of Structures, Facilities, and Associated Infrastructure at Guam National Wildlife Refuge, Ritidian Unit* (USFWS 2024b), we address the future removal of up to 10.75 ac (4.35 ha) of sihek habitat, leaving 14,102 ac (5,707 ha) remaining. This is 2,590 ac (1,048 ha) more than the 11,512-ac (4,659-ha) necessary to support recovery of the sihek. A total of 11,512 ac (4,659 ha) of sihek habitat is needed to support 500 pairs in northern Guam (the delisting population size). The acreages of sihek habitat that may be removed in the construction footprints for the proposed action, are shown in Figure 14, in the Baseline section of this document, and summarized in Table 11, below. The proposed action will adversely affect habitat for the sihek because it will remove 141 ac (57 ha) of suitable habitat that provides important habitat functions including breeding, foraging, and sheltering.

The proposed project's entire 151-ac (61 ha) Tarague Forest Enhancement Area is within the lands identified under the MOA; the conservation actions included in the project description are anticipated to protect and enhance the habitat conditions in this area and increase the suitability to support reintroduced individuals in the future. Forest enhancement at Tarague is expected to increase the sihek habitat quality at Tarague.

Table 11. Assessment of Sihek Habitat Within the Project Footprint (from PACAF 2024 p. 12).

Project Footprint	Area (Acres)	Potential Recovery Habitat Removed	Guam-wide Potential Recovery Habitat Acres	Percentage of Potential Recovery Habitat Removed ^a
North Ramp	191.4	135.0	28,403.7	0.48%
MSA-1	17.0	6.3	28,403.7	0.02%

^a Based on 2010 mapped potential recovery habitat

The area needed to support a viable northern Guam sihek subpopulation that maintains itself at a level that supports recovery is estimated to be 11,512 ac (4,659 ha). The proposed action's removal of 141 ac (57 ha) of sihek habitat from the 14,102 ac (5,707 ha) remaining, will reduce the northern Guam sihek habitat to 13,961 ac (5,650 ha). After the proposed removal of 141 ac (57 ha) of sihek habitat, 2,449 ac (991 ha) in excess of the minimum needed for recovery (11,512 ac (4,659 ha)) will remain in northern Guam.

Effects of the Action to the Åga

The åga is currently extirpated from the wild on Guam and the timelines during which direct impacts to individuals due to project noise disturbance can't be accurately assessed. However, we have determined that the proposed project will adversely affect the åga by removing areas of

habitat which, in the absence of the project, would have remained intact to provide for the feeding, breeding, and sheltering of this species once it is reintroduced. The potential habitat mapped in 2010, in relation to the construction footprint for the Proposed Action, is shown in Figure 14 in the Baseline section of this document, summarized in Table 12, below.

Table 12. Assessment of Åga Habitat Within the Project Footprint (from PACAF 2024 p. 13).

Project Footprint	Area (Acres)	Potential Recovery Habitat Removed	Guam-wide Potential Recovery Habitat Acres	Percentage of Potential Recovery Habitat Removed ^a
North Ramp	191.4	134.9	25,009.8	0.54%
MSA-1	17.0	5.8	25,009.8	0.02%

^a Based on 2010 mapped potential recovery habitat

The proposed action will result in the permanent removal of 141 ac (57 ha) of the remaining habitat that could support the conservation and recovery of åga in north Guam. The proposed 151-ac (61 ha) Tarague forest enhancement area contains 70 ac (28 ha) of åga habitat; the conservation actions included in the project description are anticipated to protect and enhance the habitat conditions in this area and increase the suitability to support reintroduced individuals in the future.

The area needed to support a viable northern Guam åga subpopulation that maintains itself at a level that supports recovery is estimated 8,046 ac (3,256 ha). Åga habitat overlaps with sihek habitat and is more limited in extent. Because our GIS analysis of sihek habitat loss, as detailed above, indicates 976 ac (395 ha) of sihek habitat has been cleared recently due to the various preceding federal and private actions, we conclude no more than 976 ac (395 ha) of åga habitat have been removed. In the *Biological Opinion for Relocation and Reconstruction of Structures, Facilities, and Associated Infrastructure at Guam National Wildlife Refuge, Ritidian Unit* (USFWS 2024b), we address the future removal of up to 10.75 ac (4.35 ha) of åga habitat. Currently, 12,975 ac (5,251 ha) of åga habitat remains in northern Guam, which is 4,385 ac (1,774 ha) more than the 8,590 ac (3,476 ha) necessary to support the recovery needs of the species in northern Guam. After the proposed removal of 141 ac (57 ha), there will remain 12,834 ac (5,194 ha) of åga habitat remaining in northern Guam, which is 4,788 ac (1,938 ha) in excess of the 8,046 ac (3,256 ha) minimum amount of northern Guam habitat needed support the recovery of åga.

Based on the above, the proposed action will adversely affect suitable habitat for the åga because it will result in the removal of 141 ac (57 ha) of habitat that provides important habitat functions including breeding, foraging, and sheltering.

Effects of the Action to Ko'ko'

The ko'ko' is currently extirpated from the wild and the timelines during which direct impacts to individuals due to project noise disturbance can't be accurately assessed. However, we have determined that the proposed project will adversely affect the ko'ko' by removing areas of recovery habitat which, in the absence of the project, would have remained intact to provide for the feeding, breeding, and sheltering of this species once it is reintroduced. The potential habitat

mapped in 2010, in relation to the construction footprint for the Proposed Action, is shown in Figure 14 in the Baseline section of this document, summarized in Table 13, below.

Table 13. Assessment of Ko'ko' Habitat Within the Project Footprint (from PACAF 2024 p. 13).

Project Footprint	Area (Acres)	Potential Recovery Habitat Removed	Guam-wide Potential Recovery Habitat Acres	Percentage of Potential Recovery Habitat Removed ^a
North Ramp	191.4	2.6	48,122.7	0.01%
MSA-1	17.0	6.9	48,122.7	0.01%

^a Based on 2010 mapped potential recovery habitat

The proposed action will result in the permanent removal of 9 ac (4 ha) of the remaining ko'ko' habitat in north Guam. The USFWS has not conducted a GIS imagery analysis to determine the current abundance of remaining ko'ko' habitat in relation to the recovery needs of the species. However, the species can occur over a broad range of habitat types, and habitat availability has, in our previous assessments, been confirmed to be abundant in distribution and quantity. The proposed 151-ac (61 ha) Tarague forest enhancement area does not contain ko'ko' habitat and therefore is not anticipated to benefit habitat that would support future reintroduction and recovery needs ko'ko'.

The area needed to support a viable ko'ko' subpopulation that maintains itself at a level that supports recovery is estimated to be 8,236 ac (3,333 ha). Our GIS analysis based on 2010 data indicated there remained 24,698 ac (9,995 ha) of ko'ko' habitat. The Relocation was anticipated to remove 1,055 ac (427 ha) of this remaining ko'ko' habitat. Additional federal and non-federal projects have removed additional habitat. After the proposed removal of 9 ac (4 ha), much more than the required minimum 8,236 ac (3,333 ha) of habitat that can support the conservation and recovery of ko'ko' will remain in northern Guam.

Summary of Effects to Extirpated Species

Individuals of the three extirpated species are not currently present in the action area. As such, no individuals will be exposed to the stressors of the action, and so we expect no effects to individuals, and no impact to the survival of individuals. However, the project will result in the permanent loss of 141 ac (57 ha) of the remaining sihek and åga habitat and 9 ac (4 ha) ko'ko' habitat. This permanent habitat loss adversely affects the species by reducing the habitat necessary for reintroduction of the species. Habitat of sufficient quantity and configuration is necessary to reintroduce the species and provide for their ability to recover in the wild.

Our GIS analysis of 2023 and 2024 satellite imagery, in addition to accounting for habitat loss due to a future Refuge relocation project (USFWS 2024b), indicates 13,961 ac (5,650 ha) of sihek habitat remain. After the proposed removal of 141 ac (57 ha) of sihek habitat, 2,449 ac (991 ha) greater than the minimum needed for to support sihek recovery (11,512 ac, 4,659 ha). We estimate 12,975 ac (5,251 ha) of åga habitat remain in northern Guam. After the proposed removal of 141 ac (57 ha) of habitat for this species, the remaining åga habitat is estimated to be 12,834 ac (5194 ha), 4,788 ac (1,938 ha) greater than the minimum needed to support åga recovery in northern Guam (8,046 ac; 3,256 ha). Although an updated GIS analysis of ko'ko' habitat has not been conducted, based on our previous analysis of the habitat in 2010, and the

limited extent of the habitat removed by the proposed action (9 ac; 4 ha) it is expected that the remaining habitat that can support ko'ko' reintroduction and recovery in northern Guam far exceeds the minimum 8,236 ac (3,333 ha) needed.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Development and wildfire will continue to further reduce the remaining abundance, connectivity, and quality of habitat for the listed species on non-federal lands within the action area. A multi-species programmatic Habitat Conservation Plan, currently in development by the Guam Department of Agriculture, Division of Aquatic and Wildlife Resources, is expected to facilitate compliance for non-federal actions and focus mitigation efforts within a network of Forest Reserve Units on Territorially owned and managed lands, some of which would be located within the action area.

Fanihi foraging and roosting on non-federal lands on Guam are expected to continue to experience chronic stress due to ongoing human disturbance. Outdoor human activities currently, and for the duration of the proposed action, are likely to frequently stress fanihi any bat that occur on non-federal lands on Guam, reducing the likelihood of fanihi roosting and reproducing in those areas.

Jeopardy Analysis

We anticipate the increased noise due to project construction, aircraft operations at the project sites will be detected by fanihi currently using the Pati Point Station 67 colony location; this location is expected to be degraded by aircraft noise to such an extent the species it will no longer be preferred habitat for the breeding and roosting of these animals; up to 214 fanihi are expected to permanently disperse from their current roost location as a result of disturbance. Because the action will occur in perpetuity, this location is expected to be permanently abandoned because of the proposed action.

Individual fanihi survival is not expected to be reduced as a result of the proposed action. The bats in this colony are expected to move to nearby conservation areas, such as the Tarague Forest Enhancement Area, where there is less disturbance, however, it may take several years for the colony to reform in a new location(s). As such, we do not anticipate that the action will directly reduce numbers of individual fanihi.

Dispersal of fanihi from the Pati Point Station 67 colony location will result in lower productivity until a new colony roost is established. As such the proposed action will impact fanihi reproduction. Fanihi reproduction on Guam (and within this relatively newly formed colony) is low, the loss of productivity associated with the proposed action is not expected to measurably influence the overall reproductive success for fanihi on Guam. Dispersal of the Pati Point Station 67 colony will adversely affect distribution of current reproductive capacity.

However, enhancement of the Tarague forest area will help ensure that fanihi can continue to forage and roost on Guam. Implementation of invasive species suppression and native forest conservation at the 151-ac (61 ha) Tarague forest enhancement area as part of the proposed action, is expected to provide fanihi foraging and roosting habitat into the future. Enhancement and maintenance of the 151-ac (61 ha) forest enhancement area at Tarague, with its abundant fruit trees and lack of invasive ungulate and little fire ant (*Wasmannia auropunctata*) disturbances will assure a relatively attractive area for fanihi roosting and foraging remains in Guam. As such, we do not expect changes to fanihi numbers, reproduction, or distribution that are significant at a population scale. As indicated in the Status of the Species and Environmental Baseline sections of this document, the overall population of fanihi, at the listed entity scale, is stable. Population numbers fluctuate with movement of fanihi between Guam and Rota, but also appear to be stable or increasing on Guam. The species also appears to be increasing on some of the other islands within the range. Dispersal of the Pati Point Station 67 is not expected to significantly influence population levels at the scale of the listed entity. On the basis of these findings, the USFWS concludes that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the fanihi in the wild.

We expect the three prongs of the project's *Cycas micronesica* conservation actions (ungulate removal, propagation and transplanting, and annual invertebrate control) will maintain the baseline condition of the *C. micronesica* species on Guam. There will be a short-term reduction in the total number of adult reproductive *C. micronesica* in the population. However, there were no seedlings detected in surveys, indicating recruitment is not occurring. The ungulate fencing is expected to enable natural recruitment to the existing wild population at Tarague, the transplanting is expected to further increase the number of wild *C. micronesica* in the population, and the annual insecticide treatment of the 1,219 wild *C. micronesica* at the forest enhancement area is expected to boost survival of the existing wild plants at that site for 20 years. Because recruitment is so limited, this introduction of young plants may increase the population's persistence. The proposed action is expected to maintain the baseline, declining, condition of the species. On the basis of these findings, the USFWS concludes that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the *C. micronesica* in the wild.

Propagation and transplanting of *T. rotensis* is expected to ensure there is no net loss of genetic diversity or numbers of mature *T. rotensis* in the wild. Although habitat for *Tabernaemontana rotensis* will be permanently removed in the project construction footprints, overall, the project will result in a net-benefit to habitat conservation for *T. rotensis* due to the proposed conservation of the forest enhancement area at Tarague. Long-term, the proposed action will not result in a net loss of habitat or number of *T. rotensis* individuals in the wild. On the basis of these findings, the USFWS concludes that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the *T. rotensis* in the wild.

There are a small number of listed orchids within the North Ramp project footprint (fewer than five *Bulbophyllum guamense* and *Dendrobium guamense*, one hundred *Tuberolabium guamense*). The number of adult orchids within the project footprints at the time of project "Year

1” will be put into conservation in the HMU forest conservation area. This will be accomplished via both transplantation and propagation and transplanting. Orchids will be collected to ensure the number of wild, healthy listed orchids in the wild is not diminished after completion of the proposed action. Seeds may be collected from other locations on Andersen AFB and propagated and maintained in a nursery until deemed suitable for transplanting to meet replacement goals. Due to the small size and growth within tree canopies, undetected orchids may be removed with vegetation clearing. However, by putting into conservation the number of adult orchids detected within the project footprints, the orchids are likely to better contribute to the long-term conservation of the species. The transplantation is not expected to result in a net loss of the conservation status of the three orchid species. On the basis of these findings, the USFWS concludes that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the *Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense* in the wild.

Individual sihek, åga, and ko’ko’ are not currently present in the action area and the proposed action will not influence the conservation status of these species in the wild or captive populations. For this reason, the proposed action will not appreciably reduce the likelihood of the survival of the species in the wild. The project will result in permanent loss of 141 ac (57 ha) of the remaining sihek and åga habitat, and 9 ac (4 ha) of ko’ko’ habitat in north Guam. The habitat areas function as potential breeding, dispersal, and foraging habitat. Permanent removal of this habitat will adversely affect the species by fragmenting and reducing the remaining amount of available habitat for reintroduction of the species and provide for their recovery needs in the wild. The proposed project’s entire 151-ac (61 ha) Tarague forest enhancement area is within the lands identified under the MOA; the conservation actions included in the project description are anticipated to protect and enhance the habitat conditions in this area and increase the suitability to support reintroductions of sihek and åga in the future. Overall, the expected amount and configuration of permanent habitat loss will not appreciably reduce the likelihood of survival and recovery of sihek, åga, and ko’ko’ because after project implementation, more than the minimum amounts of habitat needed to allow the species to survive and to support the population levels needed for recovery of the three species will remain. Therefore, the project is not expected to result in a reduction in the likelihood of the survival or recovery of sihek, åga, and ko’ko’.

After reviewing the current status of the species, the environmental baseline for the action area, the effects of the proposed development and operation of expansion of airfield and munitions infrastructure, Northwest Field and Munitions Storage Area, Andersen Air Force Base, Guam, and the cumulative effects, it is the USFWS’s biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the fanihi, *Cycas micronesica*, *Tabernaemontana rotensis*, the three orchid species (*Bulbophyllum guamense*, *Dendrobium guamense*, and *Tuberolabium guamense*), or the three extirpated species, sihek, åga, and ko’ko’. The USFWS reached this conclusion based on the following information, which is detailed in the **Effects of the Action** and **Cumulative Effects** sections, above.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the U.S. Air Force so that they become binding conditions of any grant or permit issued to any applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The U.S. Air Force has a continuing duty to regulate the activity covered by this incidental take statement. If the U.S. Air Force (1) fails to assume and implement the terms and conditions or (2) fails to require the (applicant) to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the U.S. Air Force must report the progress of the action and its impact on the species to the USFWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

The USFWS anticipates the following take will occur as a result of the proposed action:

Up to 214 adult and juvenile fanihi that roost at the Pati Point Station 67 colony will be taken as a result of disturbance in the form of harassment from increased noise associated with the proposed action.

Effect of the Take

In the accompanying Biological Opinion, the USFWS determined that this level of anticipated take is not likely to jeopardize the continued existence of the fanihi (Mariana fruit bat).

Reasonable and Prudent Measures

The USFWS finds the following reasonable and prudent measure(s) (RPM) are necessary and appropriate to minimize impacts of incidental take on the fanihi:

The conservation measures negotiated in cooperation with the USFWS and included as part of the

proposed action (see pages 13-15 of this document) constitute all of the reasonable measures necessary to minimize the impacts of incidental take. On that basis, no RPMs except for monitoring and reporting requirements are included in this Incidental Take Statement.

RPM 1: Monitor the amount and extent of anticipated take of fanihi at the Pati Point Station 67 colony.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the U.S. Air Force must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

To implement RPM 1:

Monitoring and Reporting

In order to implement the reasonable and prudent measure above, the following term and condition applies:

Term and Condition 1:

To monitor the amount and extent of take the U.S. Air Force will:

- a.) Monitor, a minimum of once a month, the number of Mariana fruit bats occupying the Station 67 colony on Andersen Air Force Base from one year prior to and one year after the proposed overflight increases are fully implemented. The monitoring methodology shall, at a minimum, include direct counts of Mariana fruit bats utilizing a spotting scope at an appropriate distance to avoid disturbance impacts to the bats.
- b.) Reports summarizing the methods and results of the above monitoring efforts shall be sent to the USFWS's Pacific Islands Fish and Wildlife Office (300 Ala Moana Blvd., Room 3-122, Box 50088, Honolulu, Hawaii 96850, or pifwo_admin@fws.gov) every six (6) months until the monitoring is completed. Results for the bat monitoring will include a table of count results, bat behavior in response to overflights, and summary of the aircraft overflights (by aircraft type) observed during monitoring events.

Conservation Recommendation

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The USFWS recommends our standard fanihi avoidance measures be implemented throughout project implementation. Avoid human activity within 492 ft (150 m) of a transiting or feeding fanihi. During all project work, monitor the project site and areas within 492 ft (150 m) of project activity for the fanihi and if a bat moves into the area, delay work until the animal(s) has left the area of its own accord. To keep the USFWS informed of actions minimizing or avoiding

adverse effects to, or benefitting, listed species or their habitats, the USFWS requests notification of the implementation of this conservation recommendation.

Statement Regarding Plants

Section 7(b)(4) and 7(o)(2) of the Act do not apply to listed plant species. However, protection of listed plants is provided to the extent the Act prohibits the removal and reduction to possession of federally listed plants or the malicious damage of endangered plants on areas under Federal jurisdiction. The proposed action here includes the translocation of federally listed plants from development footprint areas of Andersen Air Force Base to conservation areas on Andersen Air Force Base. Through this statement, and to the extent required, we are authorizing these project-related translocations of the federally listed plants as described in the proposed action and discussed in this opinion.

Reinitiation Notice

This concludes formal consultation on the actions outlined in this biological opinion. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) if the amount or extent of taking specified in the incidental take statement is exceeded; (2) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the identified action.

We appreciate your ongoing efforts to conserve threatened and endangered species. If you have any questions about this consultation, please contact Mariana Islands Geographic Team Manager Jacqueline Flores of my staff at Jacqueline_Flores@fws.gov.

Sincerely,

Michelle D. Bogardus
Deputy Field Supervisor
Pacific Islands Fish and Wildlife Office

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- [ZSSD] Zoological Society of San Diego. 2024a. Pacific Islands Fish and Wildlife Office FY24 Recovery On-the-Ground and Recovery State of the Birds Pre-Proposal: Evaluating Factors Limiting Recovery of Åga or Mariana crow (*Corvus kubaryi*) on Rota. San Deigo Zoo. San Diego, CA. 1 p.

[ZSSD] Zoological Society of San Diego. 2024b. Release Plan for Åga (Mariana Crow) Rear and Release Cohort 6 and 7: 2024. San Deigo Zoo. San Diego, CA. 19 pp.

B-4. Biological Resources Reports

Biological Survey Reports, and the Biological Assessment prepared pursuant to Section 7 of the Endangered Species Act (16 United States Code 1536[c]) in support of the Environmental Impact Statement (EIS) have not been included to reduce the encyclopedic nature of the EIS. All reports have been included in the Administrative Record for the EIS and can be provided upon request.

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APPENDICES

Appendix C: Cultural Resources Analysis Supporting Documentation



ENVIRONMENTAL IMPACT STATEMENT for
F-15 BEDDOWN and INFRASTRUCTURE UPGRADES
at ANDERSEN AIR FORCE BASE, GUAM

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Appendix C: Cultural Resources Analysis Supporting Documentation

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C-1. National Historic Preservation Act Section 106 Compliance Summary

Table C-1 provides a summary of compliance actions coordinated with the Guam State Historic Preservation Officer.

Table C-1. Summary of Compliance Actions with the Guam State Historic Preservation Officer under Section 106 of the National Historic Preservation Act

Date	Compliance Action
5/20/2020	The DAF held an initial Section 106 coordination meeting with the Guam SHPO to discuss the Proposed Action, discuss previous surveys that may be relevant to the Proposed Action, and identify an approach for additional survey efforts within the MSA-1 and North Ramp project areas.
2/2/2021	The DAF held a Section 106 coordination meeting with the Guam SHPO to discuss the survey approach and Work Plan.
3/22/2021	The DAF submitted a formal request to initiate consultation with the Guam SHPO under Section 106 of the National Historic Preservation Act.
4/20/2021	The DAF issued a Notice of Intent (Vol. 86, No. 74, <i>Federal Register</i> , 20487, April 20, 2021) to prepare an <i>EIS for Infrastructure Upgrades at Andersen AFB</i> .
4/20/2021	The DAF submitted the <i>Work Plan for the Archaeological Investigations of the Proposed Infrastructure Upgrades at Andersen Air Force Base, Guam</i> to the Guam SHPO for review.
5/7/2021	The Guam SHPO submitted comments on the Proposed Action and the Work Plan during the initial scoping period.
6/2/2021	The DAF responded to comments received from the Guam SHPO and submitted a revised <i>Final Work Plan for the Archaeological Investigations of the Proposed Infrastructure Upgrades at Andersen Air Force Base, Guam</i> .
5/8/2021 through 6/8/2021	The DAF completed an archaeological investigation from May 8 through June 8, 2021 (ChST), within the MSA-1 and North Ramp project areas, to support the initial <i>EIS for Infrastructure Upgrades at Andersen AFB</i> .
10/21/2021	The DAF submitted the <i>Draft – Final Archaeological Investigations Report of the Proposed Infrastructure Upgrades at the North Ramp and MSA_1 Areas, Andersen Air Force Base, Guam, Mariana Islands</i> to the Guam SHPO for review and comment. The DAF also requested concurrence with the NRHP eligibility determinations for historic properties within the APE.
11/23/2021	The Guam SHPO provided a response to the NRHP eligibility determinations and comments regarding the Draft Archaeological Investigations Report.
12/1/2021	The DAF held a meeting with the Guam SHPO to discuss comments received on the <i>Draft Final Archaeological Investigations Report</i> and the NRHP eligibility determinations. The Guam SHPO recommended submitting eligibility determinations to the Keeper of the NRHP.
7/26/2022	The DAF submitted the <i>National Register of Historic Places Eligibility Determination Request for 13 Archaeological Sites associated with Archaeological Investigations of Proposed Infrastructure Upgrades at Andersen Air Force Base, Guam, Mariana Islands</i> to the Keeper of the NRHP. The DAF issued a courtesy notice to the Guam SHPO of submission of the eligibility determination request to the Keeper of the NRHP.

Date	Compliance Action
8/3/2022	The DAF submitted the <i>Final Archaeological Investigations Report of the Proposed Infrastructure Upgrades at the North Ramp and MSA-1 Areas, Andersen Air Force Base, Guam, Mariana Islands</i> to the Guam SHPO.
8/26/2022	The Guam SHPO submitted a response to the DAF's courtesy notice that was sent to notify the Guam SHPO of submission of the eligibility determination request to the Keeper of the NRHP.
9/14/2022	The Keeper of the NRHP provided final determinations of eligibility on 11 of 13 sites submitted in July for its determination, 2 sites had insufficient data for final determinations.
10/27/2022	The DAF submitted a meeting request to the Guam SHPO to discuss the NRHP eligibility determinations in the request sent to the Keeper of the NRHP.
6/6/2023	JRM memorandum for record, " <i>NHPA Compliance for AAFB EIS/RSAF Beddown-2008 PA for Undertakings on the Island of Guam</i> " generated the Guam SHPO concurrence the Proposed Action cultural resources consultation requirements are covered under the 2008 PA by the development of quality work plans used in accordance with Stipulation VII.B of the 2008 PA.
5/2/2024	JRM submitted a letter to SHPO confirming that archaeological Work Plans would be submitted under Stipulation VII.B.1(a)and VII.B.1(b)of the 2008 Programmatic Agreement.
5/13/2024	The Guam SHPO confirmed receipt of the letter documenting the future submittal of the Work Plans under Stipulation VII.B.1(a)and VII.B.1(b)of the 2008 Programmatic Agreement.
8/20/2024	The DAF submitted the 2008 Programmatic Agreement for Undertakings on the Island of Guam for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base (AFB) (RC 2008-0782) revised draft work plan to the Guam SHPO.
8/29/2024	The Guam SHPO acknowledged the 2008 Programmatic Agreement for Undertaking on the Island of Guam for F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base (AFB) (RC 2008-0782) revised draft work plan for 30-day review with comments with minor recommended changes.
12/17/2024	Supplemental survey of MSA-1 completed.
2/12/2025	Andersen AFB and JRM notified SHPO of possible human skeletal remains discovered during the MSA-1 Supplemental Archaeological Survey.
2/17/2025	SHPO response requested additional investigation by a qualified archaeologist be conducted prior to any ground disturbance within the project footprint.

Key: AFB = Air Force Base; APE = Area of Potential Effect; DAF = Department of the Air Force; EIS = Environmental Impact Statement; MSA-1 = Munitions Storage Area 1; NRHP = National Register of Historic Places; SHPO = State Historic Preservation Officer

C-2. Cultural Resources Reports

The Final Archaeological Investigations Report prepared pursuant to Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations Part 800, Subpart B) in support of the Environmental Impact Statement (EIS) has not been included to reduce the encyclopedic nature of the EIS. All reports have been included in the Administrative Record for the EIS and can be provided upon request.

C-3. Summary of Cultural Resources Mitigation Measures

- A summary of the mitigation measures that DAF will implement to reduce adverse effects to cultural resources in accordance with the JRM PA include:
- Historic properties which are not listed in the current Integrated Cultural Resources Management Plan (ICRMP), but which may meet National Register of Historic Places (NRHP) criteria, will be assessed for NRHP eligibility. Historic properties will be incorporated into the ICRMP as it is revised or updated.
- Any updates to the existing Geographical Information System cultural resource layers such as shape files showing the locations of known archaeological sites and historic buildings and structures will be shared with the SHPO.
- DAF will try to avoid impacting high probability areas. If high probability areas cannot be avoided, then data recovery will occur prior to construction for these areas that contain surface and/or subsurface sites. Prior to conducting any archaeological data recovery study, DAF will submit a work plan and/or a data recovery plan to the SHPO. If a work plan and/or data recovery plan has already been approved by the SHPO for a prior project in the general area for a similar type of archaeological resource, then the same work plan and/or data recovery plan will be cited and DAF will proceed in accordance with the previously approved work plan.
- If previously unknown historic properties are discovered and are not accounted for in the archaeological monitoring plan, DAF will follow the processes outlined in Stipulation VIII(A) of the JRM PA.
- If human burials are discovered, DAF will immediately halt work in the area and contact the appropriate authorities and follow the Standard Operating Procedures specified in Appendix D of the JRM PA. Appendix D. This information will be documented and reported to the SHPO in accordance with Stipulation IX of the JRM PA.

C-4. NHPA Compliance for AAFB EIS/RSAF Beddown- 2008 PA for Undertakings on the Island of Guam Memorandum for Record

MEMORANDUM FOR RECORD

SUBJECT: NHPA COMPLIANCE FOR AAFB EIS/RSAF BEDDOWN – 2008 PA FOR
UNDERTAKINGS ON THE ISLAND OF GUAM

On Tuesday June 6, 2023 representatives from Joint Region Marianas (JRM) met with members of the Guam State Historic Preservation Office (SHPO). The meeting attendees consisted of:

Patrick Lujan - State/Territory Historic Preservation Officer
John Mark Joseph - State/Territory Archaeologist
John Salas - Regional Environmental Director (J45), JRM/NAVFAC Marianas
Megan Hawkins – Cultural Resource Manager (CRM1), JRM/NAVFAC Marianas

The meeting was specific to the 2008 Programmatic Agreement among the Commander, Navy Region Marianas, the Advisory Council on Historic Preservation, and the Guam Historic Preservation Officer regarding Navy Undertakings on the Island of Guam (“2008 PA”). The EIS/RSAF Beddown at AAFB was briefly discussed in which Patrick was informed of PACAF/AFCEC’s desired to draft a separate programmatic agreement. Patrick agreed that the proposed actions are covered by the regional PA (i.e., 2008 PA), and rather than drafting a separate PA, there would be more value in creating quality work plans that can be used in accordance with Stipulation VII.B of the 2008 PA. These work plans would not only be used for the subject undertaking, but under the 2008 PA they can also be leveraged in the future for similar activities in the same area.

The JRM CRM has consistently recommended to PACAF/AFCEC to use the existing PA. On June 6, 2023 the Guam SHPO concurred with this view.

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N.T.1523434981 Date: 2023.07.17 17:26:57
+10'00'

Megan Hawkins
Cultural Resource Manager
Joint Region Marianas

C-5. SHPO Response to Stipulation VII.B.1(a) (medium Probability Area) and Stipulation VII.B1(b) (High Probability Area) of the 2008 Programmatic Agreement for Undertakings on the Island of Guam for the F-15 Beddown and Infrastructure Upgrades at AAFB, Guam (RC 2007-0782)



Lourdes A. Leon Guerrero
Governor
Joshua F. Tenorio
Lt. Governor

Department of Parks and Recreation
Dipattamenton Plaset yan Dibuetsion
Government of Guam

Director's Office, Parks and Recreation Divisions:
#1 Paseo de Susana, Hagåtña, Guam 96910
P.O. Box 2950, Hagåtña, Guam 96932
(671) 475-6288; Facsimile (671) 477-0997
Guam Historic Resources Division:
490 Chalan Palasyo, Agaña Heights, Guam 96910
(671) 475-6294/6355; Facsimile (671) 477-2822



Angel R. Sablan
Acting Director
Warren Pelletier
Deputy Director

May 13, 2024

In reply refer to:
RC 2007-0782

T.M. Brown
Department of the Navy
Joint Region Marianas
PSC 455, Box 211
FPO AP 96540-1000

Subject: Stipulation VII.B.1(a) (Medium Probability Area) and Stipulation VII.B.1(b) (High Probability Area) of the 2008 Programmatic Agreement for Undertakings on The Island of Guam for the F-15 Beddown and Infrastructure Upgrades at Anderson Air Force Base, Guam (RC 2007-0782)

Hafa Adai Mr. Brown,

Thank you for submitting this letter notifying our office of the submission of this undertaking. Our office will await the documents. We thank Naval Facilities Engineering Systems Command Marianas and the Department of the Air Force for their continuous partnership on the 2008 Programmatic Agreement.

Should you have any questions, please contact Mr. Logan Myers, Archaeologist at (671) 475-6340 or by email: logan.myers@dpr.guam.gov.

Sincerely,

Patrick Q. Lujan
State Historic Preservation Officer

C-6. 2008 Programmatic Agreement



Preserving America's Heritage

November 20, 2008

Karen C. Sumida
Business Line Manager
Environmental
Department of the Navy
Naval Facilities Engineering Command, Pacific
258 Makalapa Dr., STE. 100
Pearl Harbor, HI 96860-3134

*Ref: Programmatic Agreement (PA) among the Commander, Navy Region Marianas, the
Advisory Council on Historic Preservation, and the Guam Historic Preservation Officer
regarding Navy Undertakings on the Island of Guam*

Dear Ms. Sumida:

Enclosed is the executed Programmatic Agreement for the referenced program. By carrying out the terms of this Agreement, the Navy will have fulfilled its responsibilities for these undertakings under Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's regulations, 36 CFR Part 800, implementing Section 106 of the National Historic Preservation Act.

If you have any questions, please call Kelly Yasaitis Fanizzo at 202-606-8583.

Sincerely,

Reid Nelson
Assistant Director
Federal Property Management Section
Office of Federal Agency Programs

Enclosure

ADVISORY COUNCIL ON HISTORIC PRESERVATION

1100 Pennsylvania Avenue NW, Suite 803 • Washington, DC 20004
Phone: 202-606-8503 • Fax: 202-606-8647 • achp@achp.gov • www.achp.gov

Commander, Navy Region Marianas PA

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**PROGRAMMATIC AGREEMENT
AMONG THE COMMANDER, NAVY REGION MARIANAS,
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION,
AND THE GUAM HISTORIC PRESERVATION OFFICER,
REGARDING NAVY UNDERTAKINGS ON THE ISLAND OF GUAM**

WHEREAS the Commander, Navy Region Marianas' (CNRM) area of responsibility (AOR) encompasses all Navy installations on the Island of Guam (Appendix A); and

WHEREAS through the Defense Base Closure and Realignment Act of 1990 as amended through the FY05 Defense Authorization Act, future acquisitions of land and/or property on Guam may occur such as a Joint Region for the Marianas; and

WHEREAS for the purposes of this Programmatic Agreement (PA), the term AOR shall refer to Navy property specifically on the Island of Guam; and

WHEREAS, CNRM, in order to meet its national defense mission requirements, authorizes, carries out or causes to be carried out a variety of undertakings including, but not limited to, dredging of its harbor, maintenance, rehabilitation, repair, construction and demolition of buildings, structures, and roads; installing, repairing, and updating utilities and infrastructure; and work regarding grounds/associated landscaping on the Island of Guam; and

WHEREAS CNRM is required to take into account the effects of its undertakings on historic properties and provide the Advisory Council on Historic Preservation (ACHP) and the appropriate State Historic Preservation Officer (SHPO) a reasonable opportunity to comment on those undertakings pursuant to Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. 470f, and its implementing regulations, 36 CFR part 800; and

WHEREAS prior to the approval of any undertaking which may directly and adversely affect any National Historic Landmark (NHL), CNRM is required, to the maximum extent possible, undertake such planning and actions as maybe necessary to minimize harm to such an NHL, and afford the ACHP a reasonable opportunity to comment on the undertaking, in accordance with Section 110(f) of the NHPA, 16 U.S.C. 470h-2(f); and

WHEREAS, CNRM has determined that these undertakings may have an effect upon historic properties, meaning listed or eligible for listing on the National Register of Historic Places (NRHP); and

WHEREAS, pursuant to 36 CFR § 800.14(b)(1) and OPNAVINST 5090.1B, CNRM has consulted with the ACHP, and the Guam SHPO in formulating this PA; and

WHEREAS, CNRM prepared an Integrated Cultural Resources Management Plan (ICRMP) in December 2005 to guide its management of historic properties while facilitating the process of designing and constructing new facilities, as required, to support CNRM's mission on the Island

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July 2008

of Guam, and has identified the majority of historic sites properties on its AOR (approximately 85-90% of the land has been surveyed and the other 10-15% is currently being surveyed), and has developed probability maps for encountering surface and subsurface historic properties on land and sea for 100% of its AOR;

NOW, THEREFORE, CNRM, the ACHP, and the SHPO agree that CNRM will carry out its undertakings on the Island of Guam in accordance with the following stipulations to satisfy its responsibilities under Sections 106 and 110(f) of the NHPA.

STIPULATIONS

CNRM shall ensure that the following measures are carried out:

I. APPLICABILITY AND DEFINITIONS

- A. This PA applies to all undertakings initiated within the Navy's AOR, regardless of whether they are initiated, funded, and/or carried out by CNRM or by another command or lessee of the Navy.
- B. In the future, if the Navy acquires more land and/or property on the Island of Guam within their AOR, then these properties and/or land shall be incorporated into this PA so long that all signatories have been consulted with and are in agreement that those lands and/or properties have been adequately evaluated and categorized under Stipulation V of this PA. However, any signatory to this PA may request a formal amendment to the PA as outlined in Stipulation XII.
- B. Unless otherwise noted, this PA will utilize the definitions found at 36 CFR §800.16.

II. PROFESSIONAL STANDARDS

- A. All surveys, testing, and mitigation planning regarding archaeological resources will be carried out by, or under the oversight or supervision of a person or persons meeting the professional qualification for Archaeologist found in "The Secretary of the Interior's (SOI) Historic Preservation Professional Qualification Standards" (SOI Qualification Standards), 62 Fed. Reg. 33712.
- B. All historic property surveys and eligibility determinations for historic buildings and structures will be carried out by or under the oversight or supervision of a person or persons meeting the professional qualifications for Historical Architect under Standard a or b found in SOI Qualification Standards, 62 Fed. Reg. 33719 or Architectural Historian under Standard a or b found in SOI Qualification Standards, 62 Fed. Reg. 33713-4 or Historic Landscape Architect under Standard a or b found in SOI Qualification Standards, 62 Fed. Reg. 33720.

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II. PROFESSIONAL STANDARDS (Continued)

- C. Where CNRM utilizes contracts that involve work governed by this PA that may affect historic properties, CNRM will use appropriate contract performance requirements, and/or appropriate source selection criteria which shall include minimum qualifications for historic preservation experience and satisfactory prior performance, as appropriate to the nature of the work and the type of procurement, developed with the participation of Navy professionals meeting the standards of Stipulation II.B, for projects involving historic buildings and structures, or II.A, for projects involving archaeological sites. Appropriate historic preservation requirements shall address: project planning; description or scope; adequate pre-construction survey of historic properties affected; professional qualifications of contractor personnel; refurbishment and reuse of historic materials and fixtures; minimizing demolition of historic fabric; and supervision, oversight, and accountability.

III. OTHER AGREEMENTS

Pursuant to 36 CFR §800.14, federal agencies can negotiate and adopt other types of agreements in addition to programmatic agreements.

- A. Nothing in this PA will alter, modify, or supersede the application of the following Section 106 program alternatives in the Navy's AOR:
1. World War II (WWII) Temporary Buildings Programmatic Memorandum of Agreement among the U.S. Department of Defense, the ACHP, and the National Conference of State Historic Preservation Officers (NCSHPO) executed on 7 July 1986 with 1 May 1991 amendments.
 2. Management of Historic Family Housing Units Programmatic Agreement among the U.S. Navy, the Advisory Council on Historic Preservation, and the NCSHPO executed on 17 November 2000.
 3. Wherry and Capehart Era Family Housing program comment issued by ACHP on 18 November 2004.
 4. Cold War Era (1946-1974) Unaccompanied Personnel Housing Program comment issued by the ACHP on 18 August 2006.
 5. WWII and Cold War Era (1939-1974) Ammunition Storage Facilities Program comment issued by the ACHP on 18 August 2006.

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IV. IMPLEMENTATION OF GUAM ICRMP

CNRM completed an ICRMP in December 2005 to guide its management of historic properties on Navy installations. Included in this ICRMP are probability maps for encountering surface, subsurface, and submerged archaeological resources on land and sea for all Navy installations on Guam. These probability maps (Appendix B) are based on historic maps, ethno-historic data, archaeological studies, and previous consultations with the SHPO. All maps will be maintained and updated as appropriate by or under the oversight of Navy personnel meeting qualifications under Stipulation II.A as new data is collected and based on future consultations with the SHPO. Any new versions of this map will be included in the quarterly reporting requirements described in Stipulation IX.

V. IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES

- A. In accordance with its Section 110 responsibilities and when either the 2005 ICRMP is revised or updated, or a new ICRMP is developed, CNRM shall update its existing inventory of historic properties. Currently, all known properties are listed in the 2005 ICRMP. As future studies are conducted, additional historic properties eligible for the NRHP may be identified. Any property not listed in the current ICRMP, but which may meet NRHP criteria, shall be assessed for NRHP eligibility, by or under the oversight of Navy personnel meeting applicable qualifications under Stipulation II. These historic properties will be incorporated into ICRMP as it is revised or updated, or if a new ICRMP is developed in consultation with the SHPO.
- B. Any signatories to this PA may bring to the attention of CNRM information relating to any property in the AOR believed by the signatory to be eligible for listing on the NRHP, with a request that the eligibility of the property be evaluated. If CNRM and the SHPO do not agree on a determination of eligibility, or if the ACHP so requests, CNRM will obtain a determination of eligibility from the Keeper of the NRHP.
- C. For purposes of this PA, CNRM may treat any property not previously listed or determined eligible for listing on the NRHP as National Register eligible if determined to be so eligible by Navy personnel qualified under Stipulation II.A or Stipulation II.B, as applicable. Such determination requires no SHPO review. Any such determinations will be included in the reporting requirements described in Stipulation IX.
- D. Any updates to the existing Geographical Information System cultural resource layers such as shape files showing the locations of known archaeological sites and historic buildings and structures will be shared with the SHPO. The SHPO recognizes that these layers may contain sensitive information and shall not disseminate or make them available to the public without obtaining permission of CNRM.

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VI. CULTURAL ACCESS TO HISTORIC SITES .

- A. In recognition of the significance that many historic properties within the Navy's AOR have to the Chamorro people and other groups, CNRM will generally look favorably on affording access to historic sites to individuals and organizations that attach significance to these historic properties where security requirements are not prohibitive. Upon request, CNRM will consider events that celebrate and interpret historic activities tied to historic actions/events that occurred on Navy property on Guam.
- B. Requests for such access need to be submitted and received by CNRM Cultural Resource Manager at least 30 days advance of the requested visit date and must be in writing. Reasonable requests will be considered by CNRM in light of military operational requirements and anti-terrorist/force protection security conditions and other pertinent circumstances as determined by CNRM at the time.
- C. If the SHPO is approached by individuals or organizations wishing to obtain access to historic properties on Navy property, the SHPO will forward these requests to the Navy for consideration.
- D. Final approval or disapproval will be provided by the Navy in writing at least one week prior to the requested visit date. The CNRM Cultural Resource Manager will escort all visitors to these sites where access is allowed to ensure that sites are not damaged and artifacts are not removed during these visits.

VII. REVIEW AND MITIGATION OF PROJECT EFFECTS

- A. Undertakings Requiring No Further Review
 - 1. If no historic properties will be impacted by an undertaking and the undertaking is located in the following categories, then no further review is required:
 - a. No Probability Areas (Fill Lands): If an undertaking is located in fill lands represented as no probability areas within Appendix B;
 - b. Low Probability Areas: If an undertaking is located in a low probability area as shown in Appendix B, and if evaluated by or under the supervision of Navy personnel that meet Stipulations II.A or II.B, as applicable;
 - c. Listed in Appendix C

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2. For purposes of Stipulation VII.A.1, alteration of a historic property consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines will not be deemed to affect historic properties.
 3. All determinations that no further review is required and are listed under Stipulation VII.A.1, will be documented and reported to the SHPO in accordance with Stipulation IX.
- B. Undertakings with Potential Effects, No Adverse Effects, and Adverse Effects:

1. Archaeology

As stated in Stipulation V, CNRM has developed archaeological probability maps for all Navy properties on Guam. CNRM may identify, evaluate and resolve adverse effects on archeological historic properties on the medium and high probability maps according to the following review processes (Stipulation VII.B.1.a and b), if such review is carried out by, or under the supervision of, Navy personnel meeting the qualification standards on Stipulation II. Otherwise, these archeological historic properties will be reviewed in accordance with the same review process as others under 36 CFR 800.3-800.7.

a. Medium Probability Areas

Medium Probability Areas contain no surface sites, and have never been tested. However, there is the potential to encounter subsurface historic resources.

1. Subsurface archaeological testing shall be conducted in the area prior to construction. However, in some instances this may not be feasible due to a variety of factors (such as: the area to be tested is located below an existing building/structure, or for proposed undertakings with long linear-shaped excavations such as utility replacements). In these cases, archaeological monitoring shall be required in lieu of subsurface testing.
2. Prior to conducting subsurface archaeological testing or archaeological monitoring, CNRM shall submit a work plan to the SHPO. The SHPO shall have 30 calendar days to review and approve this plan. If the SHPO disagrees with the plan within 30 calendar days from receipt of the plan, the SHPO shall advise CNRM of the reasons for the disagreement in writing; otherwise concurrence will be presumed after 30 calendar days. CNRM shall

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consult with the SHPO to try and resolve the disagreement. If such consultation fails, CNRM shall request the ACHP to review the dispute in accordance with Stipulation XI – Resolving Objections.

3. If a work plan has already been approved by the SHPO for a prior project in the same area, then the same work plan can be cited and CNRM shall proceed in accordance with the approved work plan.

b. High Probability Areas

High Probability Areas have either been previously surveyed and have documented surface or subsurface sites, or are areas identified from historic maps or ethnographic accounts as areas of known land use (e.g. location of old villages).

1. If possible, CNRM will try to avoid impacting high probability areas.
2. If high probability areas cannot be avoided, then data recovery shall be required prior to construction for these areas that contain surface and/or subsurface sites.
3. Prior to conducting any archaeological data recovery study, CNRM shall submit a work plan and/or a data recovery plan to the SHPO. The SHPO shall have 30 calendar days to review and approve this plan. If the SHPO disagrees with the plan within 30 calendar days from receipt of the plan, the SHPO shall advise CNRM of the reasons for the disagreement in writing; otherwise, concurrence will be presumed after 30 calendar days. CNRM shall consult with the SHPO to try and resolve the disagreement. If such consultation fails and no agreement can be reached, then CNRM request the ACHP to review the dispute in accordance with Stipulation XI.
4. If a work plan and/or data recovery plan has already been approved by the SHPO for a prior project in the general area for a similar type of archaeological resource, then the same work plan and/or data recovery plan can be cited and CNRM shall proceed in accordance with the previously approved work plan.

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2. Non-Archeological Historic Properties

Procedures outlined in 36 CFR 800.3 through 800.7 will be followed for undertakings that:

- a. Have the potential to affect a historic property eligible for the NRHP and are not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines;
- b. If the undertaking is not listed in Appendix C.

VIII. DISCOVERIES AND EMERGENCIES

- A. If during the performance of an undertaking, previously unknown historic properties are discovered and are not accounted for in the archaeological monitoring plan, CNRM will:
 1. Halt work in the immediate area and take reasonable measure to avoid or minimize impacts to the property until consultation is completed with the SHPO on how to mitigate the impacts or document the newly discovered historic property. Work shall not resume until consultation on the treatment plan is completed with the SHPO.
 2. A qualified Navy professional meeting the relevant qualifications under Stipulation II shall inspect the discovered property and determine whether it is eligible for listing on the NRHP.
 - a. If the discovery is not eligible for the NRHP, then the Navy will proceed with the project but the discovery will be documented in the archaeological monitoring report and submitted to the SHPO.
 - b. If the Navy qualified professional determines the property is eligible, he or she shall notify the SHPO via telephone, fax or e-mail and document this discovery and report it to the SHPO in accordance with Stipulation IX. The Navy shall begin consultation with the SHPO on how to mitigate the impacts or document the newly discovered historic property and document this in a treatment plan. CNRM will also make a reasonable and good faith effort to notify Chamorro organizations or other groups that might attach significance to historic properties within the AOR. CNRM shall consider any input from such organizations within the consultation period. Consultation shall not exceed 14 workdays unless mutually agreed upon. If SHPO does not object to the recommendations cited in the treatment plan within the agreed time frame, CNRM will implement it. If there is a disagreement over treatment plan and it cannot be resolved, then the disagreement will be resolved per then Stipulation XI will be followed.

Commander, Navy Region Marianas PA

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- B. If during the performance of an undertaking human burials are discovered, CNRM shall immediately halt work in the area and contact the appropriate authorities and follow the Standard Operating Procedures (SOP) specified in Appendix D. This information shall be documented and reported to the SHPO in accordance with Stipulation IX.
- C. In the event that natural disasters (such as typhoons or tidal waves), fires, sudden disruptions of utilities service, spill events or other emergency events occur, CNRM may take immediate actions to preserve life and property without having to undergo Section 106 review. However, emergency response work will take into consideration that historic properties maybe affected by recovery or emergency efforts. When possible, such emergency actions will be undertaken in a manner that does not foreclose future preservation or restoration of historic properties. CNRM will notify the SHPO by telephone of the emergency and will follow up with written documentation if any historic properties were discovered or disturbed during the emergency events. Consultation with the SHPO will be conducted as soon as practical based on the emergency circumstances. These actions will be included in the report developed in accordance with Stipulation IX.

IX. REPORTING REQUIREMENTS

CNRM shall submit a quarterly report to the SHPO within three months from execution of this PA and every three months thereafter. This report shall list a summary of actions taken under Stipulations IV, V(C), VII(A)(1), VII(A)(2), VIII(A), VIII(B) and VIII(C); to contain:

1. Project name
2. Location/Area
3. A brief description of proposed action
4. Applicable provision(s) of Appendix C (if any)
5. Name of reviewer
6. Date project was reviewed
7. Number of new historic sites discovered

X. REVIEW

The ACHP and the SHPO may elect to review activities carried out pursuant to this PA and CNRM will cooperate with the ACHP and the SHPO in carrying out their review responsibilities.

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XI. RESOLVING OBJECTIONS

- A. Should any signatory to this PA object in writing to CNRM regarding any action carried out or proposed with respect to the implementation of this PA, CNRM shall consult with the objecting party. If after initiating such consultation CNRM determines that the objection cannot be resolved through consultation, it shall forward all documentation relevant to the objection to the ACHP, including CNRM proposed response to the objection.
- B. Within 30 calendar days after receipt of all pertinent documentation, the ACHP shall exercise one of the following options:
 1. Concur with CNRM proposed response; or
 2. Provide CNRM with recommendations on the proposed response. COMNAVREG shall take into account such recommendations before making a final decision on the matter and proceeding accordingly; or
 3. Notify CNRM that the objection will be referred to the ACHP membership for formal comment per 36 CFR §800.7(c). The resulting formal comment shall be taken into account by the Navy in accordance with 36 CFR §800.7(c). If the ACHP has not responded within the allotted time, CNRM may make a final decision on the objection and proceed accordingly.

XII. AMENDMENT

Any signatory to this PA may request that this PA be amended. Such requests will be made in writing and provided to the other signatories. The requests will include the proposed amendments and the reasons for proposing them. The parties shall consult to consider the proposed amendment. No amendment shall take effect until it has been executed by all signatories.

XIII. TERMINATION

Any signatory may propose to terminate this PA by providing 30 calendar days written notice to the other signatories explaining the reasons for the proposed termination. The signatories will consult during this period to seek agreement on amendments or other actions that would avoid termination. If the signatory proposing the termination does not withdraw the proposal by the end of the 30 day period, or a longer period agreed to by all signatories, then the PA will be terminated. In the event of termination, CNRM will comply with 36 CFR Part 800 with regard to all individual undertakings.

Commander, Navy Region Marianas PA

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XIV. ANTI DEFICIENCY ACT

- A. The Anti-Deficiency Act, 31 USC § 1341, prohibits federal agencies from incurring an obligation of funds in advance of or in excess of available appropriations. Accordingly, the parties agree that any requirement for obligation of funds arising from the terms of this agreement shall be subject to the availability of appropriated funds for that purpose, and that this agreement shall not be interpreted to require the obligation or expenditure of funds in violation of the Anti-Deficiency Act.
- B. If compliance with the Anti-Deficiency Act alters or impairs CNRM' ability to implement the stipulations of this PA, CNRM shall consult with the signatories in accordance with Stipulation XI or Stipulation XII.

XV. DURATION

This PA shall become effective upon execution by all signatories and shall remain in effect for a period of 50 years unless terminated prior to that in accordance with Stipulation XIII.

XVI. MEETING

At intervals of five (5) years, beginning at the execution of this PA, the signatories shall meet to review the implementation of this PA, and determine whether any amendment to the PA is needed.

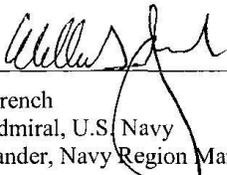
Commander, Navy Region Marianas PA

July 2008

EXECUTION AND IMPLEMENTATION of this Programmatic Agreement evidences that CNRM has taken into account the effects of the undertakings under its scope on historic properties and afforded the ACHP an opportunity to comment on them.

Each of the undersigned certifies that they have full authority to bind the party that they represent for purposes of entering into this agreement.

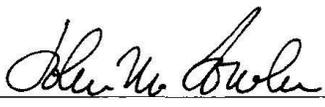
COMMANDER, NAVY REGION MARIANAS

By:  _____ Date: 10¹³ 08/08
W.D. French
Rear Admiral, U.S. Navy
Commander, Navy Region Marianas

GUAM (STATE) HISTORIC PRESERVATION OFFICER

By:  _____ Date: 10-31-08
Joseph W. Duenas
Acting Guam (State) Historic Preservation Officer

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By:  _____ Date: 4/21/08
John M. Fowler
Executive Director

Commander, Navy Region Marianas PA

July 2008

ACRONYMS

ACHP	Advisory Council on Historic Preservation
AOR	Area of Responsibility
CNRM	Commander, Navy Region Marianas
JPAC	Joint POW/MIA Accounting Command
MIA	Missing in Action
NCSHPO	National Conference of State Historic Preservation Officers
NHL	National Historic Landmark
NHPA	National Historic Preservation Act of 1966
NRHP	National Register of Historic Places
PA	Programmatic Agreement
POW	Prisoner of War
SHPO	Guam (State) Historic Preservation Officer
SOI	Secretary of the Interior
SOP	Standard Operating Procedures
TCP	Traditional Cultural Properties
WWII	World War II

APPENDICES

Appendix D: Coastal Zone Management Act Negative Determination



ENVIRONMENTAL IMPACT STATEMENT for
F-15 BEDDOWN and INFRASTRUCTURE UPGRADES
at ANDERSEN AIR FORCE BASE, GUAM

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Appendix D: Coastal Zone Management Act Compliance

**D-1. Negative Determination for the Proposed F-15 Beddown and Infrastructure
Upgrades D-1**

D-2. Summary Assessment of Effects on Guam’s Coastal Resources D-5

Tables

Table D-1. Summary Assessment of Effects on Guam’s Coastal Resources D-5

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D-1. Negative Determination for the Proposed F-15 Beddown and Infrastructure Upgrades



DEPARTMENT OF THE AIR FORCE PACIFIC AIR FORCES

Colonel Ethan A. Rutell, USAF
Chief, Futures Division
25 E. St, Suite B-210
JBPHH, HI, 96853

Ms. Lola L. Guerrero, Director
Guam Coastal Management Program
Bureau of Statistics and Plans
P.O. Box 2950
Hagåtña, Guam 96932

Subject: Negative Determination for the Proposed F-15 Beddown and Infrastructure Upgrades at Andersen Air Force Base (AFB), Guam

Dear Ms. Guerrero,

The Department of the Air Force (DAF) proposes to construct facilities and have up to 12 Republic of Singapore Air Force F-15 fighter aircraft operate at Andersen AFB, Guam. The use of these facilities will be consistent with the types of operations currently occurring on the installation. The DAF determined that the proposed federal activity is a development project outside of Guam's defined coastal zone. This letter provides documentation that the DAF has determined that the proposed activity would not have foreseeable coastal effects to Guam's defined coastal zone per 15 CFR 930, Section 930.35.

The aircraft are anticipated to start flying operations in 2029 which includes takeoffs and landings to and from training areas over the ocean. Andersen AFB will also host additional aircraft periodically in support of training mission requirements. The aircraft beddown will include an increase in 240 personnel, on a permanent basis, and an additional 200 personnel on a temporary basis for occasional events.

Infrastructure upgrades will be adjacent to the northwest corner of the main airfield and within Munitions Storage Area-1. Upgrades to the infrastructure incorporate airfield pavements, hangar, flightline maintenance facility, utility buildings, jet fuel systems and storage, fencing, utility extensions, roadways, parking, stormwater management infrastructure, and earth-covered munitions storage structures. Construction will begin in 2025 and take place over three to seven years. Approximately 209 acres on Andersen AFB will be disturbed during construction, which will either result in developed land or will be returned to maintained vegetation areas.

The purpose of the proposed action is to provide critical infrastructure that enhances U.S. posture west of the International Date Line. Additionally, the proposed action provides the Republic of Singapore a location to conduct enhanced aircraft training. Improving the airfield and munitions infrastructure will address capability gaps and allow for greater efficiencies.

The DAF reviewed requirements for strategic capabilities within the Indo-Pacific region and identified Andersen AFB for this initiative, dismissing five other potential locations. Once Andersen AFB was identified, several areas on the installation were considered. Only the proposed action was determined to meet the selection standards for infrastructure upgrades.

The DAF is releasing a Draft Environmental Impact Statement (EIS) for proposed F-15 Beddown and Infrastructure Upgrades at Andersen AFB, Guam. We invite you to review and provide comments on the Draft EIS. To ensure the DAF has sufficient time to consider your input, please submit comments by July 29, 2024 by the methods mentioned in the last paragraph.

The DAF has completed an “effects” test per 15 CFR Part 930 Section 930.33(a)(1). The DAF assessed cumulative effects on Guam’s coastal use and resources, reviewed relevant management program enforceable policies, and determined that the project does not have foreseeable effects on Guam’s defined coastal zone per 15 CFR 930, Section 930.35. The summary assessment of potential impacts relative to each enforceable policy is attached and provided in Appendix D, Table D-1 of the Draft EIS. This notification of negative determination is based on the following:

- The proposed federal activity is located entirely within federal property that by definition is excluded from Guam’s coastal zone per 15 CFR 923, Section 923.33(a), and would not result in spillover effects extending into Guam’s coastal zone per 15 CFR 923, Section 923(b).
- The proposed federal activities at both the airfield and the MSA-1 are located on a plateau approximately 500 feet above sea level, and a minimum of approximately 1.55 miles from the nearest coastal zone. None of the proposed federal activities would spill-over to adjacent parcels of nonfederal property.
- The proposed federal development projects are consistent with existing uses as military mission support and are entirely within areas on Andersen AFB currently used for or adjacent to airfield operations and munitions storage.
- Site-specific stormwater management infrastructure and implementation of the Stormwater Pollution Prevention Plan would avoid and minimize potential environmental effects.
- The proposed activities are similar to previous DAF activities that have been determined to have no coastal effects.

Notification of the availability of the Draft EIS will appear in the Federal Register. We invite you to review and comment. Additional information about the Proposed Action is provided in the attached Brochure. The Draft EIS is available online for review and for download at the project website, www.aafbinfraandf15eis.com and is also available for review at the following libraries:

- Nieves M. Flores Memorial Library, 254 Martyr Street, Hagatña, GU 96910; and
- University of Guam Robert F. Kennedy Memorial Library, Government Documents, Tan Siu Lin Building, UOG Station, 303 University Drive, Mangilao, GU 96923.

The DAF will hold public meetings in Guam to seek input on the Proposed Action. We invite you to participate. Dates, times, and locations of the meetings are included in the attached Meeting Flyer. This flyer may be reproduced and distributed. Both meetings will follow an open house format. Additional information is available on the project website. Specific materials may be requested at the addresses provided in the last paragraph.

Public, agency, and stakeholder comments provided during the public meetings, through email, via postal mail, and/or on the project website will be considered in preparation of the Final EIS. Substantive comments will be responded to in the Final EIS. The DAF also welcomes comments under Section 106 of the National Historic Preservation Act (36 CFR Part 800) regarding the identification of or effects on historic properties. To ensure the DAF has sufficient time to consider your input on the Draft EIS and Section 106 process, please submit your comments by July 29, 2024.

HQ PACAF | *Final Environmental Impact Statement*
for F-15 Beddown and Infrastructure Upgrades at Andersen AFB
APPENDIX D: COASTAL ZONE MANAGEMENT ACT COMPLIANCE

Regarding the Negative Determination per 15 CFR 930, Section 930.35, we are hopeful that a response from the Bureau of Statistics and Plans can occur within 30 days or less from receipt of this package. However, if no response is received from your office within 60 days, the DAF shall presume concurrence with the negative determination per 16 CFR Section 930.35(c).

If you have comments or questions on this project, or materials requests, please submit them by visiting the project website, www.AAFBInfraAndF15EIS.com/provide-comments. Additionally, you may provide verbal or written comments during the public meetings; or contact the project team point of contact, Mr. David Martin, via e-mail at afcec.aafbinfrasandf-15eis@us.af.mil or via US Postal Service mail at HQ AFCEC/CIE, Attn: Mr. David Martin, Bldg. 171, 2261 Hughes Ave., Ste. 155, JBSA Lackland AFB, TX 78236-9853.

Sincerely,

RUTELL.ETHA
N.A.125610224
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ETHAN A. RUTELL, Colonel, USAF
Chief, Futures Division

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RUTELL.ETHAN.A.125610
2249
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Attachments:

Brochure - Draft EIS for the F-15 Beddown and Infrastructure Upgrades at Andersen AFB
Meeting Flyer - Draft EIS for F-15 Beddown and Infrastructure Upgrades at Andersen AFB

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D-2. Summary Assessment of Effects on Guam’s Coastal Resources

Table D-1. Summary Assessment of Effects on Guam’s Coastal Zone Resources

CZMP Enforceable Policy	Policy Objective	Assessment
Development Policies		
Shore Area Development	<p>Only those uses shall be located within the Seashore Reserve that enhance, are compatible with or do not generally detract from the surrounding coastal area’s aesthetic and environmental quality and beach accessibility; or can demonstrate dependence on such a location and the lack of feasible alternative sites.</p> <p><i>Intent:</i> To ensure environmental aesthetic compatibility of shore area land uses</p>	<p>Not applicable. There is no planned development or activity in the Seashore Reserve or in any near shore areas. All development is within federal property at Andersen AFB; therefore, areas being developed are not included in the Guam coastal zone. The new munitions igloos and airfield infrastructure would be constructed and operated in areas of the installation already providing or adjacent to those mission support land uses. Therefore, the projects would be consistent with existing land uses and would not appreciably change the existing shore aesthetic.</p>
Urban Development	<p>Commercial, multi-family, industrial and resort-hotel zone uses and uses requiring high levels of support facilities shall be concentrated within appropriate zone as outlined on the Guam Zoning Code.</p> <p><i>Intent:</i> Cluster high impact uses such that coherent community design, function, infrastructure support and environmental compatibility are assured.</p>	<p>Not applicable. The project does not include plans for urban development, and all project locations are on federal property.</p>
Rural Development	<p>Rural districts shall be designated in which only low density residential and agricultural uses will be acceptable. Minimum lot size for these uses should be one-half acre until adequate infrastructure including functional sewerage is provided.</p> <p><i>Intent:</i> Provide a development pattern compatible with environmental and infrastructure support suitability and which can permit traditional lifestyle patterns to continue to the extent practicable.</p>	<p>Not applicable. The project locations are entirely within federal property and do not affect rural lands.</p>

CZMP Enforceable Policy	Policy Objective	Assessment
Major Facility Siting	<p>In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Comprehensive Development and Coastal Management Plans, Guam shall recognize the national interest in the siting of such facilities, including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major reservoir sites.</p> <p><i>Intent:</i> Include the national interest in the siting proposals for major utilities, fuel, and transport facilities.</p>	<p>Not applicable. The project does not include plans to site, construct, or operate any major utilities, fuel, or transport facilities. The proposed project would expand existing utility and field infrastructure to support the proposed facilities at the airfield and MSA-1 within federal property.</p>
Hazardous Areas	<p>Identified hazardous lands, including flood plains, erosion-prone areas, air installations' crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety or welfare of the people of Guam, and complies with the land use regulations.</p> <p><i>Intent:</i> Development in hazardous areas will be governed by the degree of hazard and the land use regulations.</p>	<p>Not applicable. The Proposed Action would be contained within federal property.</p> <p>Construction activities would comply with applicable building standards for seismic risks and sinkholes associated with limestone karst. Should unexploded munitions be encountered as part of the grading and construction activities, workers would cease activities, in accordance with federal regulations, and immediately report the finding to the appropriate installation safety personnel. Storage of munitions in the proposed igloos would not result in appreciable changes to the existing federally required explosive safety quantity distances for MSA-1. The proposed facilities are sited into areas on the installation that already provide munitions storage and airfield infrastructure, and do not include proposed development in hazardous areas outside of the installation.</p>

CZMP Enforceable Policy	Policy Objective	Assessment
Housing	<p>The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and human-made hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.</p> <p><i>Intent:</i> Promote efficient community design placed where the resources can support it.</p>	Not applicable. There is no planned residential development.
Transportation	<p>Guam shall develop an efficient and safe transportation system, while limiting adverse environmental impacts on primary aquifers, beaches, estuaries, coral reefs, and other coastal resources.</p> <p><i>Intent:</i> Provide transportation systems while protecting potentially impacted resources.</p>	Not applicable. All transportation infrastructure for this project would be contained within federal property. Expansion of the airfield to include the new infrastructure would include construction and use of additional aprons and taxiways to support safe transit of aircraft to and from hangars and the airfield. These would not be used for general vehicle transit.
Erosion and Siltation	<p>Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land use regulations, as well as other related land use guidelines for such areas.</p> <p><i>Intent:</i> Control Development where erosion and siltation damage are likely to occur.</p>	<p>Not applicable. The Proposed Action would be implemented entirely within federal property and outside the Guam coastal zone.</p> <p>Site-specific stormwater management infrastructure and implementation of the Stormwater Pollution Prevention Plan would avoid and minimize potential environmental effects. Because the new facilities at the airfield and within MSA-1 would exceed 5,000 square feet (465 square meters) in total area of ground disturbance, the planning, design, and construction of the facilities would incorporate a low-impact development LID approach in accordance with United Facilities Criteria (UFC) 3-210-10 <i>Low Impact Development</i> and the <i>Technical Guidance on Implementing Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act</i>. Additionally, new stormwater basins and injection wells would be installed to manage runoff.</p>

CZMP Enforceable Policy	Policy Objective	Assessment
Resources Policies:		
Air Quality	<p>All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air quality.</p> <p><i>Intent:</i> To control activities to ensure good air quality.</p>	<p>Not applicable. Emissions from infrastructure upgrades generated by equipment and vehicles would be intermittent and localized to MSA-1 and airfield project areas during different phases of construction. The F-15 beddown would not: (1) exceed the PSD major source thresholds in the AQCR 246 attainment area; nor (2) contribute to a violation of any federal, state, or local air regulation.</p>
Water Quality	<p>Safe drinking water shall be assured, and aquatic recreation sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuaries, reef, and aquifer areas.</p> <p><i>Intent:</i> To control activities that may degrade Guam's drinking, recreational, and ecologically sensitive waters.</p>	<p>Not applicable. The project would be entirely within federal property, and there are no surface waters on or near the MSA-1 or airfield that would be affected to potentially contribute to downstream coastal zone effects.</p> <p>A site-specific Stormwater Pollution Prevention Plan and Spill Prevention, Control, and Countermeasure Plan minimize potential for groundwater contamination from leaks and spills from stored fuels, motor pool wastes, and other materials used during operations.</p>
Fragile Areas	<p>Development in the following types of fragile areas including Guam's Marine Protected Areas (MPA) shall be regulated to protect their unique character:</p> <ul style="list-style-type: none"> • historical and archeological sites • wildlife habitats • pristine marine and terrestrial communities • limestone forests • mangrove stands and other wetlands • coral reefs <p><i>Intent:</i> To protect significant cultural areas, and natural marine and terrestrial wildlife and plant habitats.</p>	<p>Not applicable. The project would be implemented and affect resources entirely within federal property. No mangrove stands, wetlands, MPA, coral reefs, or other marine communities would be affected by the Proposed Action site preparation, construction, or operational activities.</p> <p>During Section 7 and Section 106 consultations, the DAF will request concurrence with the conclusions in the EIS regarding potential effects on protected species and cultural resources on the installation, respectively.</p>

CZMP Enforceable Policy	Policy Objective	Assessment
Living Marine Resources	<p>All living resources within the waters of Guam, particularly fish, shall be protected from over harvesting and, in the case of corals, sea turtles and marine mammals, from any taking whatsoever.</p> <p><i>Intent:</i> To protect marine resources in Guam's waters.</p>	<p>Not applicable. No marine resources or near shore areas would be affected by the Proposed Action site preparation, construction, or operational activities.</p>
Visual Quality	<p>Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws. Visually objectionable uses shall be located to the maximum extent practicable so as not to degrade significant views from scenic overlooks, highways, and trails.</p> <p><i>Intent:</i> To protect the quality of Guam's natural scenic beauty.</p>	<p>Not applicable. The planned development and activities would occur entirely within the military installation, and would not be visible from scenic overlooks, highways, trails, or other public areas. The new munitions igloos and airfield infrastructure would be constructed and operated in areas of the installation already providing those mission support land uses. Therefore, the projects would be consistent with existing land uses and would not appreciably change the existing aesthetic.</p>
Recreation Areas	<p>The Government of Guam shall encourage development of varied types of recreational facilities located and maintained so as to be compatible with the surrounding environment and land uses, adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife, marine conservation and marine protected areas, scenic overlooks, parks, and historical sites. Developments, activities and uses shall comply with the Guam Recreational Water Use Management Plan (RWUMP).</p> <p><i>Intent:</i> To encourage environmentally compatible recreational development.</p>	<p>Not applicable. There is no planned development outside the military installation or in recreational areas, and no recreational areas would be affected by proposed activities.</p>

CZMP Enforceable Policy	Policy Objective	Assessment
Public Access	<p>The public's right of unrestricted access shall be ensured to all non-federally owned beach areas and all Guam recreation areas, parks, scenic overlooks, designated conservation areas and their public lands. Agreements shall be encouraged with the owners of private and federal property for the provision of releasable access to and use of resources of public nature located on such land.</p> <p><i>Intent:</i> To ensure the right of public access.</p>	<p>Not Applicable. None of the planned development and activities would affect public access to beaches, shore areas, parks, or other public lands.</p>
Agricultural Lands	<p>Critical agricultural land shall be preserved and maintained for agricultural use.</p> <p><i>Intent:</i> To stop urban types of development on agricultural land.</p>	<p>Not Applicable. There is no planned development outside the military installation or on agricultural lands.</p>

APPENDICES

Appendix E: Socioeconomics Analysis Supporting Documentation



ENVIRONMENTAL IMPACT STATEMENT for
F-15 BEDDOWN and INFRASTRUCTURE UPGRADES
at ANDERSEN AIR FORCE BASE, GUAM

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Appendix E: Socioeconomics Analysis Supporting Documentation

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Table E-4. Impact on Gross Island Product (in millions of 2023 dollars) E-4
Table E-5. Annual Impacts of Additional Personnel (in millions of 2023 dollars)..... E-5

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E-1. Economic Impact Analysis of Construction Spending

Economic impact analyses are often performed using commercial software such as IMPLAN[®]. IMPLAN[®] uses United States (U.S.) business transaction data and industry sector classifications to determine how spending in one sector leads to purchases of goods and services from all other sectors, including households. IMPLAN[®] summarizes the total amount and type of transactions as “multipliers.” These economic multipliers are multiplicative factors derived from input-output (I-O) tables that can be used to assess how expenditures in one sector led to wider economic activity across other sectors. Analytically, the product of a multiplier and a spending level can produce estimates of total “direct” (within-sector impacts), “indirect” (across-sector impacts), and “induced” (household spending impacts).

IMPLAN[®] accounts for business transactions for several types of construction, as defined by the U.S. Census. Using IMPLAN[®] involves determining which of its sectors provides a reasonable approximation to purchases of the project being analyzed. The closest construction sector in IMPLAN[®] to the Proposed Action is assumed to be sector 54 – Construction of New Highways and Streets, for several reasons. First, similar to road construction, the Proposed Action is likely to involve significant amounts of horizontal concrete construction and stormwater management. It is also assumed that the Proposed Action will require similar types of goods and services from design and environmental services, materials, transportation, and other sectors.

IMPLAN[®] data are also customizable in a multitude of ways and can be adjusted so that the ratio of construction spending to employment more directly correlates with the project rather than be based solely on the local industry data. Recognizing that IMPLAN[®] sector 54 differs from the Proposed Action, the IMPLAN[®] data on that sector was adjusted to reflect differences in labor demand expected for the Proposed Action. Only the labor demand data were adjusted, and data on wages and other labor factors were assumed to be the same. Note also that all dollar values were adjusted, as appropriate, to account for inflation.¹

The Proposed Action was estimated to cost approximately \$1 billion dollars (in 2021 dollars) and require approximately 5 years to complete. The Department of the Air Force (DAF) estimated that 500 workers would be required per year for the Proposed Action. Therefore, the project would require an approximate annual spending level of \$200 million and an estimated labor demand of 25 workers per \$10 million. Additionally, based on DAF review of construction worker demand to support current and ongoing development projects on the installation and projections for completion of those projects, it is expected that the required 500 workers would be available to support the Proposed Action at its start in 2024. These estimates are consistent with recent Department of Defense (DoD) proposals for project efforts on Guam and recently collected data from the Guam Government Department of Labor (GuamGov DOL).

¹ Note that the analysis was initially conducted in IMPLAN[®] and was updated in 2023. As a part of the update, the analysis results were inflated to 2023 dollars using the Gross Domestic Product deflator from the U.S. Bureau of Economic Analysis Table 1.1.9. Implicit Price Deflators for Gross Domestic Product.

GuamGov DOL provided totals for construction workers currently on Guam, the number of H-2B visa construction workers on the island and their countries of origin.²

Based on similar project requirements, this analysis assumed a total of approximately 30 percent of positions were anticipated to be held by Guam residents. Guam faces challenges associated with obtaining materials, equipment, and labor locally.

Note that any potential difference in economic impacts between a resident worker and a foreign worker could relate to whether a foreign worker sends some earnings back to their home country. IMPLAN[®] data would capture this potential difference because it tracks all household spending within the economy, relative to income earned there. Accordingly, the only difference in resident and foreign worker economic impacts relates to the percentage share that each contributes to all Proposed Action jobs.

Table E-1 summarizes the main data inputs used in the IMPLAN[®] analysis to account for project- specific parameters and the Guam workforce.

Table E-1. Summary of Assumptions

Assumption	Assumed Value ^a	Source of Rationale ^{b,c}
Annual Construction Spending	Approximately \$200M per year (\$2021)	HDR
Construction Implementation Duration	5 years	HDR
Worker Requirement Factor (Adjustment to IMPLAN Sector 54)	25 Workers per \$10M in Spending (\$2021)	DAF and GuamGov DOL
Percentage of Construction Jobs Held by Guam Residents (determines Guam resident economic contribution to total impact)	30%	DAF and GuamGov DOL

Notes: M – million

^a All dollar values are estimates.

^b Assumptions were based on recently completed DoD NEPA and proposals for construction efforts in Guam.

^c Per email from G. Massey (GuamGov DOL) to HDR regarding construction worker and H-2B Visa workers. July 20, 2021.

Several forms of economic impacts, presented below, are produced from IMPLAN[®] multipliers such as jobs, labor income, and gross island product (GIP; i.e., the total impact of spending on the economy). For each economic impact metric, several stages of spending are presented, and the sum of all three types of spending is equal to the total impact.

Considering employment first, **Table E-2** shows the following results:

- **Direct impacts** account for the effects of construction spending within the construction sector that remain on the island. Under the Proposed Action, the direct impact of construction spending involving 500 construction employees over 5 years, and approximately 30 percent of those employees would come from Guam.
- **Indirect impacts** represent the number of ancillary employees in Guam that would be involved in providing the goods and services associated with approximately \$200 million

² Per email from G. Massey (GuamGov DOL) to HDR regarding construction worker and H-2B Visa workers. July 20, 2021.

in construction spending per year. **Table E-2** indicates that approximately 286 such employees would be hired because of the Proposed Action; over 5 years, this amounts to a total of 1,432 job-years.

- **Induced impacts** are associated with the increase in spending by households that occur because of all direct and indirect jobs created by the \$200 million in construction spending per year. **Table E-2** indicates that an additional 106 jobs would be created each year by household spending.

Table E-2. Impact on Employment Demand

Type of Impact	Annual	Total (5-Years)	Guam Resident Contribution to Total	Foreign Worker Contribution to Total
Direct Impact	500	2,500	750	1,750
Indirect Impact	286	1,423	429	1,002
Induced Impact	106	529	159	370
Total Impact	892	4,460	1,338	3,122

IMPLAN[®] computes the incomes earned from additional jobs using average wages for jobs in each sector. For instance, the \$23.2 million in direct income is based on the average wage for all workers in IMPLAN[®] sector 54 (see **Table E-3**). Indirect and induced annual income payments of \$12.9 million and \$4.0 million, respectively, would be generated across a wide range of sectors where jobs and spending occur. Those additional income payments are computed the same way as direct income: the product of numbers of new jobs in each impacted sector and average wages per sector, respectively.

As summarized in **Table E-3**, over the 5-year construction period, labor income in Guam would increase by \$200.1 million across all sectors of the economy. Approximately \$60 million would be directly attributable to Guam resident earnings and spending. Income paid to foreign construction workers would amount to approximately \$81.1 million (if indeed they occupy 70 percent of positions). Foreign worker spending on Guam over that time would likely add approximately \$45.1 million (indirect impact) and \$13.8 million (induced impact) to incomes in non-construction sector spending across the island.

Table E-3. Impact on Labor Income (in millions of 2023 dollars)

Type of Impact	Annual	Total (5-Years)	Guam Resident Contribution to Total	Foreign Worker Contribution to Total
Direct Impact	\$23.2	\$115.8	\$34.7	\$81.1
Indirect Impact	\$12.9	\$64.5	\$19.3	\$45.1
Induced Impact	\$4.0	\$19.8	\$5.9	\$13.8
Total Impact	\$40.0	\$200.1	\$60.0	\$140.0

GIP is an overall measure of economic impact because it accounts for the net contribution to the economy from spending on all goods and services. GIP for Guam is analogous to gross domestic product, which is measured on a national scale. The direct, indirect, and induced GIP impacts are shown in **Table E-4** for the Proposed Action. Results indicate that the total

economic impact of the Proposed Action would exceed \$72 million per year and \$361 million over the 5-year construction period.

Table E-4. Impact on Gross Island Product (in millions of 2023 dollars)

Type of Impact	Annual	Total (5-Years)	Guam Resident Contribution to Total	Foreign Worker Contribution to Total
Direct Impact	\$40.9	\$204.7	\$61.4	\$143.3
Indirect Impact	\$22.6	\$112.9	\$33.9	\$79.0
Induced Impact	\$8.8	\$43.9	\$13.2	\$30.7
Total Impact	\$72.3	\$361.4	\$108.4	\$253.0

E-2. Economic Impact Analysis of Additional Personnel

The Proposed Action also includes the beddown of up to 12 Republic of Singapore Air Force F-15 fighter aircraft at Andersen Air Force Base (AFB), and would include airfield operations, supporting aircraft operations, and personnel to support the F-15 squadron’s mission requirements. The F-15 beddown is anticipated to begin in 2029 and would not be wholly dependent upon completion of the infrastructure upgrade construction. Approximately 205 personnel³ would be required, which would include DAF and/or partner nation personnel (officer, enlisted, and civilian) and contractor support.

As of March 2023, IMPLAN® no longer provided economic data for Guam.⁴ Therefore, the results of an economic assessment of the Marine Corps Base (MCB) Hawaii⁵ were used to estimate the impacts of additional personnel on the Guam economy. More specifically, the results of the analysis of MCB Hawaii personnel on neighboring communities were used.⁶ The original job multiplier was updated to account for productivity improvements using historical data on labor productivity for private nonfarm business sector in Hawaii from the U.S. Bureau of Labor Statistics, Office of Productivity and Technology.

As shown in **Table E-5**, additional military and civilian personnel at Andersen AFB could generate a total GIP of \$60.1 million per year. In addition to the 205 personnel at the base, 29 jobs could be created in the rest of the economy as a result of household spending (induced effect). Overall, the total labor impact is estimated at \$45.4 million per year.

³ The corresponding payroll is estimated at \$40.3 million (in 2023 dollars) based on an average payroll per employee of \$189,760 (in 2022 dollars) (Andersen AFB. 36th Wing Economic Impact Statement 2022.).

⁴ Similarly, the US. Bureau of Economic Analysis Regional Input-Output Modeling System (RIMS II) does not provide economic multipliers for any of the U.S. territories, including Guam.

⁵ MCB Hawaii. Economic Impact Analysis of Marine Corps Base Hawaii. Final report prepared by Marstel-Day, LLC and HDR Engineering, Inc. May 2014.

⁶ Neighboring communities consist of ZIP Codes 96701 (Aiea), 96734 (Kailua), 96744 (Kaneohe), 96795 (Waimanalo) and 96863 (MCBH Kaneohe Bay). As of 2022, the population in these ZIP codes totaled 162,251, according to the U.S. Census Bureau. By comparison, the population of Guam was estimated at 168,801.

Table E-5. Annual Impacts of Additional Personnel (in millions of 2023 dollars)

Impact Metric	Direct Impact	Indirect Impact	Induced Impact	Total Impact
GIP	\$50.9	\$0.0	\$9.3	\$60.1
Labor Income	\$40.3	\$0.0	\$5.2	\$45.4
Employment	205	0	29	234

Note that no indirect effect is associated with additional personnel because a military installation does not produce goods or services like other sectors of the economy (i.e., there is no production function). Also, the effects of personnel are a function of total payroll, regardless of the type of personnel (military versus civilian).

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APPENDICES

Appendix F: Air Quality Analysis Supporting Documentation



ENVIRONMENTAL IMPACT STATEMENT for
F-15 BEDDOWN and INFRASTRUCTURE UPGRADES
at ANDERSEN AIR FORCE BASE, GUAM

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Appendix F: Air Quality Analysis Supporting Documentation

F-1. Detailed Air Conformity Applicability Model Report	F-1
F-2. Air Conformity Applicability Model Report Record of Air Analysis	F-47
F-3. Air Conformity Applicability Model Report Greenhouse Gas (GHG) Emissions ...	F-49

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F-1. Detailed Air Conformity Applicability Model Report

1. General Information

1. General Information

- Action Location

Base: ANDERSEN AFB
State: Guam
County(s): Guam
Regulatory Area(s): NOT IN A REGULATORY AREA

- Action Title: North Ramp Upgrades and F-15 Beddown at Andersen AFB

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2025

- Action Purpose and Need:

The purpose of the Proposed Action is to provide critical infrastructure that enhances U.S. posture west of the International Date Line. Additionally, the purpose of the Proposed Action is to beddown and operate Republic of Singapore Air Force (RSAF) fighter aircraft at Andersen AFB to support training requirements. The Proposed Action is needed to enhance DAF capability to support U.S. and partner nation forces within the Indo-Pacific region and strengthen the U.S.'s ability to respond regionally and worldwide, through construction of infrastructure upgrades and increased support of fighter aircraft, in alignment with evolving DAF and DoD strategies and initiatives for the region. Increasing and improving airfield and munitions infrastructure would address capability gaps and allow for greater efficiencies and agility in the way ground operations are conducted.

- Action Description:

The DAF proposes to beddown and support the mission requirements of 12 RSAF F-15 fighter aircraft, and construct infrastructure upgrades at Andersen AFB, Guam, in support of DAF and DoD strategies and initiatives for the Indo-Pacific. Once construction is completed, the use of this infrastructure would be consistent with the types of operations currently occurring on the installation. The proposed infrastructure would have multiple uses, and could support both the F-15 beddown and other DAF, service component, and partner nation aircraft or missions operating from Andersen AFB now or in the future. The infrastructure would provide options for parking, storing, maintaining, refueling, loading, and unloading the F-15s and other aircraft on the installation, as well as storing munitions, which would improve upon current strategic capabilities and posture with regard to ground maneuverability. The F-15 beddown and proposed infrastructure each have standalone value for supporting the defense of U.S. interests in the Indo-Pacific region, in accordance with the Pacific Deterrence Initiative and as described in Purpose and Need for the Proposed Action.

- Point of Contact

Name: x
Title: x
Organization: x
Email: x
Phone Number: x

Report generated with ACAM version: 5.0.23a

- Activity List:

No.	Activity Type	Activity Title
2.	Construction / Demolition	North Ramp Construction
3.	Emergency Generator	Backup Generators
4.	Tanks	Jet Fuel
5.	Degreaser	Degreasers
6.	Personnel	Personnel
7.	Aircraft	F-15 LTO Operations
8.	Aircraft	F-15 TGO Operations
9.	Aircraft	Rotational KC-135 LTO Operations
10.	Aircraft	Rotational KC-135 TGO Operations
11.	Aircraft	F-15 Destination Operations
12.	Aircraft	KC-135 Destination GHG Emissions

Emission factors and air emission estimating methods come from the United States Air Force’s Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Construction / Demolition

2.1 General Information & Timeline Assumptions

- Activity Location

County: Guam

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: North Ramp Construction

- Activity Description:

North Ramp Construction

- Activity Start Date

Start Month: 1

Start Month: 2025

- Activity End Date

Indefinite: False

End Month: 12

End Month: 2025

- Activity Emissions:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)
VOC	4.892785	PM 10	7.062782
SO _x	0.027840	PM 2.5	0.492798
NO _x	15.273637	Pb	0.000000
CO	15.769050	NH ₃	0.168705

- Activity Emissions of GHG:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)
CH ₄	0.141087	CO ₂	4868.191224
N ₂ O	0.385084	CO ₂ e	4986.469098

- Global Scale Activity Emissions for SCGHG:

Pollutant	Total Emissions (TONs)	Pollutant	Total Emissions (TONs)
CH ₄	0.141087	CO ₂	4868.191224
N ₂ O	0.385084	CO ₂ e	4986.469098

2.1 Site Grading Phase

2.1.1 Site Grading Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2025

- Phase Duration

Number of Month: 12
 Number of Days: 0

2.1.2 Site Grading Phase Assumptions

- General Site Grading Information

Area of Site to be Graded (ft²): 39621
 Amount of Material to be Hauled On-Site (yd³): 2000000
 Amount of Material to be Hauled Off-Site (yd³): 0

- Site Grading Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 6

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Graders Composite	2	8
Off-Highway Trucks Composite	2	0
Other Construction Equipment Composite	2	8
Rubber Tired Dozers Composite	2	8
Scrapers Composite	2	0
Tractors/Loaders/Backhoes Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20
 Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

Category	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

Category	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.1.3 Site Grading Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Factor	VOC	SOx	NOx	CO	PM 10	PM 2.5
<i>Excavators Composite [HP: 36] [LF: 0.38]</i>						
Emission Factors	0.40191	0.00542	3.44643	4.21104	0.10704	0.09848
<i>Graders Composite [HP: 148] [LF: 0.41]</i>						
Emission Factors	0.33951	0.00490	2.85858	3.41896	0.15910	0.14637
<i>Off-Highway Trucks Composite [HP: 376] [LF: 0.38]</i>						
Emission Factors	0.17748	0.00488	1.08595	1.17415	0.03850	0.03542
<i>Other Construction Equipment Composite [HP: 82] [LF: 0.42]</i>						
Emission Factors	0.29762	0.00487	2.89075	3.51214	0.17229	0.15851
<i>Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]</i>						
Emission Factors	0.37086	0.00491	3.50629	2.90209	0.15396	0.14165
<i>Scrapers Composite [HP: 423] [LF: 0.48]</i>						
Emission Factors	0.20447	0.00489	1.90932	1.57611	0.07394	0.06803
<i>Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]</i>						
Emission Factors	0.19600	0.00489	2.00960	3.48168	0.07738	0.07119

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Factor	CH4	N2O	CO2	CO2e
<i>Excavators Composite [HP: 36] [LF: 0.38]</i>				
Emission Factors	0.02382	0.00476	587.13772	589.15263
<i>Graders Composite [HP: 148] [LF: 0.41]</i>				
Emission Factors	0.02155	0.00431	531.19419	533.01712
<i>Off-Highway Trucks Composite [HP: 376] [LF: 0.38]</i>				
Emission Factors	0.02144	0.00429	528.58735	530.40133
<i>Other Construction Equipment Composite [HP: 82] [LF: 0.42]</i>				
Emission Factors	0.02141	0.00428	527.74261	529.55369

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APPENDIX F: AIR QUALITY ANALYSIS SUPPORTING DOCUMENTATION

Factor	CH4	N2O	CO2	CO2e
<i>Rubber Tired Dozers Composite [HP: 367] [LF: 0.4]</i>				
Emission Factors	0.02159	0.00432	532.17175	533.99803
<i>Scrapers Composite [HP: 423] [LF: 0.48]</i>				
Emission Factors	0.02146	0.00429	528.94235	530.75755
<i>Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]</i>				
Emission Factors	0.02149	0.00430	529.86270	531.68105

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

Factor	VOC	SOx	NOx	CO	PM 10	PM 2.5	NH3
LDGV	0.26952	0.00154	0.14103	3.84122	0.00441	0.00390	0.05145
LDGT	0.22481	0.00192	0.18918	3.46257	0.00510	0.00451	0.04317
HDBGV	0.78167	0.00430	0.65797	10.65810	0.02143	0.01896	0.09228
LDDV	0.10644	0.00125	0.15141	5.33268	0.00349	0.00321	0.01636
LDDT	0.21012	0.00143	0.48470	5.15564	0.00569	0.00524	0.01737
HDDV	0.12457	0.00427	2.47637	1.51837	0.05028	0.04626	0.06568
MC	2.63976	0.00182	0.67831	12.51787	0.02253	0.01993	0.05364

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

Factor	CH4	N2O	CO2	CO2e
LDGV	0.01539	0.00507	325.63146	327.52624
LDGT	0.01543	0.00713	404.10371	406.61141
HDBGV	0.05371	0.02608	905.72567	914.83256
LDDV	0.05264	0.00067	370.74398	372.26042
LDDT	0.04013	0.00098	421.66823	422.96444
HDDV	0.02658	0.16189	1270.04904	1318.95535
MC	0.11135	0.00299	394.07840	397.75399

2.1.4 Site Grading Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
 ACRE: Total acres (acres)
 WD: Number of Total Work Days (days)
 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)
 NE: Number of Equipment
 WD: Number of Total Work Days (days)
 H: Hours Worked per Day (hours)

HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONS)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONS)
 VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.2 Trenching/Excavating Phase

2.2.1 Trenching / Excavating Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration

Number of Month: 12
Number of Days: 0

2.2.2 Trenching / Excavating Phase Assumptions

- General Trenching/Excavating Information

Area of Site to be Trenched/Excavated (ft²): 5943
 Amount of Material to be Hauled On-Site (yd³): 0
 Amount of Material to be Hauled Off-Site (yd³): 0

- Trenching Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 6

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Excavators Composite	2	8
Other General Industrial Equipment Composite	1	8
Tractors/Loaders/Backhoes Composite	1	8

- Vehicle Exhaust

Average Hauling Truck Capacity (yd³): 20
 Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

Category	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

Category	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.2.3 Trenching / Excavating Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Factor	VOC	SOx	NOx	CO	PM 10	PM 2.5
<i>Excavators Composite [HP: 36] [LF: 0.38]</i>						
Emission Factors	0.40191	0.00542	3.44643	4.21104	0.10704	0.09848
<i>Other General Industrial Equipment Composite [HP: 35] [LF: 0.34]</i>						
Emission Factors	0.49122	0.00542	3.71341	4.67487	0.13603	0.12515
<i>Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]</i>						
Emission Factors	0.19600	0.00489	2.00960	3.48168	0.07738	0.07119

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Factor	CH ₄	N ₂ O	CO ₂	CO _{2e}
<i>Excavators Composite [HP: 36] [LF: 0.38]</i>				
Emission Factors	0.02382	0.00476	587.13772	589.15263
<i>Other General Industrial Equipment Composite [HP: 35] [LF: 0.34]</i>				
Emission Factors	0.02385	0.00477	588.02637	590.04433
<i>Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]</i>				
Emission Factors	0.02149	0.00430	529.86270	531.68105

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

Factor	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.26952	0.00154	0.14103	3.84122	0.00441	0.00390	0.05145
LDGT	0.22481	0.00192	0.18918	3.46257	0.00510	0.00451	0.04317
HDBGV	0.78167	0.00430	0.65797	10.65810	0.02143	0.01896	0.09228
LDDV	0.10644	0.00125	0.15141	5.33268	0.00349	0.00321	0.01636
LDDT	0.21012	0.00143	0.48470	5.15564	0.00569	0.00524	0.01737
HDDV	0.12457	0.00427	2.47637	1.51837	0.05028	0.04626	0.06568
MC	2.63976	0.00182	0.67831	12.51787	0.02253	0.01993	0.05364

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

Factor	CH ₄	N ₂ O	CO ₂	CO _{2e}
LDGV	0.01539	0.00507	325.63146	327.52624
LDGT	0.01543	0.00713	404.10371	406.61141
HDBGV	0.05371	0.02608	905.72567	914.83256
LDDV	0.05264	0.00067	370.74398	372.26042
LDDT	0.04013	0.00098	421.66823	422.96444
HDDV	0.02658	0.16189	1270.04904	1318.95535
MC	0.11135	0.00299	394.07840	397.75399

2.2.4 Trenching / Excavating Phase Formula(s)

- Fugitive Dust Emissions per Phase

$$PM10_{FD} = (20 * ACRE * WD) / 2000$$

- PM10_{FD}: Fugitive Dust PM 10 Emissions (TONs)
- 20: Conversion Factor Acre Day to pounds (20 lb / 1 Acre Day)
- ACRE: Total acres (acres)
- WD: Number of Total Work Days (days)
- 2000: Conversion Factor pounds to tons

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

- CEE_{POL}: Construction Exhaust Emissions (TONs)
- NE: Number of Equipment
- WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)
 HP: Equipment Horsepower
 LF: Equipment Load Factor
 EF_{POL}: Emission Factor for Pollutant (g/hp-hour)
 0.002205: Conversion Factor grams to pounds
 2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = (HA_{OnSite} + HA_{OffSite}) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 HA_{OnSite}: Amount of Material to be Hauled On-Site (yd³)
 HA_{OffSite}: Amount of Material to be Hauled Off-Site (yd³)
 HC: Average Hauling Truck Capacity (yd³)
 (1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Vehicle Exhaust On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 WD: Number of Total Work Days (days)
 WT: Average Worker Round Trip Commute (mile)
 1.25: Conversion Factor Number of Construction Equipment to Number of Works
 NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.3 Building Construction Phase

2.3.1 Building Construction Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
Start Quarter: 1
Start Year: 2025

- Phase Duration

Number of Month: 12

Number of Days: 0

2.3.2 Building Construction Phase Assumptions

- General Building Construction Information

Building Category: Office or Industrial
Area of Building (ft²): 297160
Height of Building (ft): 12
Number of Units: N/A

- Building Construction Default Settings

Default Settings Used: No
Average Day(s) worked per week: 6

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Cement and Mortar Mixers Composite	1	0
Concrete/Industrial Saws Composite	1	0
Cranes Composite	2	7
Forklifts Composite	2	7
Generator Sets Composite	2	8
Other Construction Equipment Composite	1	0
Other General Industrial Equipment Composite	1	0
Other Material Handling Equipment Composite	1	0
Plate Compactors Composite	1	0
Pressure Washers Composite	1	0
Rough Terrain Forklifts Composite	1	0
Tractors/Loaders/Backhoes Composite	2	8
Welders Composite	3	8

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

Category	LDGV	LDGT	HDTV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

Category	LDGV	LDGT	HDTV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

- Vendor Trips

Average Vendor Round Trip Commute (mile): 40

- Vendor Trips Vehicle Mixture (%)

Category	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

2.3.3 Building Construction Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Factor	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
<i>Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]</i>						
Emission Factors	0.55317	0.00854	4.19957	3.25548	0.16367	0.15057
<i>Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]</i>						
Emission Factors	0.43930	0.00743	3.63468	4.34820	0.10060	0.09255
<i>Cranes Composite [HP: 367] [LF: 0.29]</i>						
Emission Factors	0.20113	0.00487	1.94968	1.66287	0.07909	0.07277
<i>Forklifts Composite [HP: 82] [LF: 0.2]</i>						
Emission Factors	0.26944	0.00487	2.55142	3.59881	0.13498	0.12418
<i>Generator Sets Composite [HP: 14] [LF: 0.74]</i>						
Emission Factors	0.54223	0.00793	4.34662	2.86938	0.17681	0.16267
<i>Other Construction Equipment Composite [HP: 82] [LF: 0.42]</i>						
Emission Factors	0.29762	0.00487	2.89075	3.51214	0.17229	0.15851
<i>Other General Industrial Equipment Composite [HP: 35] [LF: 0.34]</i>						
Emission Factors	0.49122	0.00542	3.71341	4.67487	0.13603	0.12515
<i>Other Material Handling Equipment Composite [HP: 93] [LF: 0.4]</i>						
Emission Factors	0.18284	0.00488	1.95728	3.45611	0.06558	0.06033
<i>Plate Compactors Composite [HP: 8] [LF: 0.43]</i>						
Emission Factors	0.54682	0.00884	4.14353	3.47065	0.16191	0.14896
<i>Pressure Washers Composite [HP: 14] [LF: 0.3]</i>						
Emission Factors	0.52906	0.00857	4.37688	3.26192	0.18062	0.16617
<i>Rough Terrain Forklifts Composite [HP: 96] [LF: 0.4]</i>						
Emission Factors	0.11845	0.00489	1.69423	3.22091	0.03622	0.03332
<i>Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]</i>						
Emission Factors	0.19600	0.00489	2.00960	3.48168	0.07738	0.07119
<i>Welders Composite [HP: 46] [LF: 0.45]</i>						
Emission Factors	0.49757	0.00735	3.67618	4.52476	0.11274	0.10373

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Factor	CH4	N2O	CO2	CO2e
<i>Cement and Mortar Mixers Composite [HP: 10] [LF: 0.56]</i>				
Emission Factors	0.02313	0.00463	570.17504	572.13174

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Factor	CH4	N2O	CO2	CO2e
Concrete/Industrial Saws Composite [HP: 33] [LF: 0.73]				
Emission Factors	0.02333	0.00467	575.01338	576.98668
Cranes Composite [HP: 367] [LF: 0.29]				
Emission Factors	0.02140	0.00428	527.58451	529.39505
Forklifts Composite [HP: 82] [LF: 0.2]				
Emission Factors	0.02138	0.00428	527.10822	528.91712
Generator Sets Composite [HP: 14] [LF: 0.74]				
Emission Factors	0.02305	0.00461	568.32220	570.27253
Other Construction Equipment Composite [HP: 82] [LF: 0.42]				
Emission Factors	0.02141	0.00428	527.74261	529.55369
Other General Industrial Equipment Composite [HP: 35] [LF: 0.34]				
Emission Factors	0.02385	0.00477	588.02637	590.04433
Other Material Handling Equipment Composite [HP: 93] [LF: 0.4]				
Emission Factors	0.02145	0.00429	528.77815	530.59278
Plate Compactors Composite [HP: 8] [LF: 0.43]				
Emission Factors	0.02306	0.00461	568.40604	570.35666
Pressure Washers Composite [HP: 14] [LF: 0.3]				
Emission Factors	0.02344	0.00469	577.82852	579.81148
Rough Terrain Forklifts Composite [HP: 96] [LF: 0.4]				
Emission Factors	0.02145	0.00429	528.72612	530.54057
Tractors/Loaders/Backhoes Composite [HP: 84] [LF: 0.37]				
Emission Factors	0.02149	0.00430	529.86270	531.68105
Welders Composite [HP: 46] [LF: 0.45]				
Emission Factors	0.02305	0.00461	568.30078	570.25105

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

Factor	VOC	SOx	NOx	CO	PM 10	PM 2.5	NH3
LDGV	0.26952	0.00154	0.14103	3.84122	0.00441	0.00390	0.05145
LDGT	0.22481	0.00192	0.18918	3.46257	0.00510	0.00451	0.04317
HDGV	0.78167	0.00430	0.65797	10.65810	0.02143	0.01896	0.09228
LDDV	0.10644	0.00125	0.15141	5.33268	0.00349	0.00321	0.01636
LDDT	0.21012	0.00143	0.48470	5.15564	0.00569	0.00524	0.01737
HDDV	0.12457	0.00427	2.47637	1.51837	0.05028	0.04626	0.06568
MC	2.63976	0.00182	0.67831	12.51787	0.02253	0.01993	0.05364

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

Factor	CH4	N2O	CO2	CO2e
LDGV	0.01539	0.00507	325.63146	327.52624

Factor	CH4	N2O	CO2	CO2e
LDGT	0.01543	0.00713	404.10371	406.61141
HDTV	0.05371	0.02608	905.72567	914.83256
LDDV	0.05264	0.00067	370.74398	372.26042
LDDT	0.04013	0.00098	421.66823	422.96444
HDDV	0.02658	0.16189	1270.04904	1318.95535
MC	0.11135	0.00299	394.07840	397.75399

2.3.4 Building Construction Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = BA * BH * (0.42 / 1000) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

BA: Area of Building (ft²)

BH: Height of Building (ft)

(0.42 / 1000): Conversion Factor ft³ to trips (0.42 trip / 1000 ft³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

- Vender Trips Emissions per Phase

$$VMT_{VT} = BA * BH * (0.38 / 1000) * HT$$

VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 BA: Area of Building (ft²)
 BH: Height of Building (ft)
 (0.38 / 1000): Conversion Factor ft³ to trips (0.38 trip / 1000 ft³)
 HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)
 VMT_{VT}: Vender Trips Vehicle Miles Travel (miles)
 0.002205: Conversion Factor grams to pounds
 EF_{POL}: Emission Factor for Pollutant (grams/mile)
 VM: Worker Trips On Road Vehicle Mixture (%)
 2000: Conversion Factor pounds to tons

2.4 Architectural Coatings Phase

2.4.1 Architectural Coatings Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2025

- Phase Duration

Number of Month: 12
 Number of Days: 0

2.4.2 Architectural Coatings Phase Assumptions

- General Architectural Coatings Information

Building Category: Non-Residential
 Total Square Footage (ft²): 297160
 Number of Units: N/A

- Architectural Coatings Default Settings

Default Settings Used: Yes
 Average Day(s) worked per week: 5 (default)

- Worker Trips

Average Worker Round Trip Commute (mile): 20 (default)

- Worker Trips Vehicle Mixture (%)

Category	LDGV	LDGT	HdGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.4.3 Architectural Coatings Phase Emission Factor(s)

- Worker Trips Criteria Pollutant Emission Factors (grams/mile)

Factor	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.26952	0.00154	0.14103	3.84122	0.00441	0.00390	0.05145
LDGT	0.22481	0.00192	0.18918	3.46257	0.00510	0.00451	0.04317
HDGV	0.78167	0.00430	0.65797	10.65810	0.02143	0.01896	0.09228
LDDV	0.10644	0.00125	0.15141	5.33268	0.00349	0.00321	0.01636
LDDT	0.21012	0.00143	0.48470	5.15564	0.00569	0.00524	0.01737
HDDV	0.12457	0.00427	2.47637	1.51837	0.05028	0.04626	0.06568
MC	2.63976	0.00182	0.67831	12.51787	0.02253	0.01993	0.05364

- Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

Factor	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01539	0.00507	325.63146	327.52624
LDGT	0.01543	0.00713	404.10371	406.61141
HDGV	0.05371	0.02608	905.72567	914.83256
LDDV	0.05264	0.00067	370.74398	372.26042
LDDT	0.04013	0.00098	421.66823	422.96444
HDDV	0.02658	0.16189	1270.04904	1318.95535
MC	0.11135	0.00299	394.07840	397.75399

2.4.4 Architectural Coatings Phase Formula(s)

- Worker Trips Emissions per Phase

$$VMT_{WT} = (1 * WT * PA) / 800$$

- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 1: Conversion Factor man days to trips (1 trip / 1 man * day)
- WT: Average Worker Round Trip Commute (mile)
- PA: Paint Area (ft²)
- 800: Conversion Factor square feet to man days (1 ft² / 1 man * day)

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL}: Vehicle Emissions (TONs)
- VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL}: Emission Factor for Pollutant (grams/mile)
- VM: Worker Trips On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_{AC} = (AB * 2.0 * 0.0116) / 2000.0$$

- VOC_{AC}: Architectural Coating VOC Emissions (TONs)
- BA: Area of Building (ft²)
- 2.0: Conversion Factor total area to coated area (2.0 ft² coated area / total area)
- 0.0116: Emission Factor (lb/ft²)

2000: Conversion Factor pounds to tons

2.5 Paving Phase

2.5.1 Paving Phase Timeline Assumptions

- Phase Start Date

Start Month: 1
 Start Quarter: 1
 Start Year: 2025

- Phase Duration

Number of Month: 12
 Number of Days: 0

2.5.2 Paving Phase Assumptions

- General Paving Information

Paving Area (ft²): 328900

- Paving Default Settings

Default Settings Used: No
 Average Day(s) worked per week: 6

- Construction Exhaust

Equipment Name	Number Of Equipment	Hours Per Day
Pavers Composite	2	8
Paving Equipment Composite	4	6
Rollers Composite	4	6

- Vehicle Exhaust

Average Hauling Truck Round Trip Commute (mile): 20

- Vehicle Exhaust Vehicle Mixture (%)

Category	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	0	0	0	0	0	100.00	0

- Worker Trips

Average Worker Round Trip Commute (mile): 20

- Worker Trips Vehicle Mixture (%)

Category	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	50.00	50.00	0	0	0	0	0

2.5.3 Paving Phase Emission Factor(s)

- Construction Exhaust Criteria Pollutant Emission Factors (g/hp-hour)

Factor	VOC	SO _x	NO _x	CO	PM 10	PM 2.5
<i>Pavers Composite [HP: 81] [LF: 0.42]</i>						
Emission Factors	0.24787	0.00486	2.64574	3.44523	0.13933	0.12819
<i>Paving Equipment Composite [HP: 89] [LF: 0.36]</i>						
Emission Factors	0.20238	0.00487	2.21583	3.41771	0.08945	0.08229
<i>Rollers Composite [HP: 36] [LF: 0.38]</i>						
Emission Factors	0.56682	0.00541	3.67816	4.11298	0.16639	0.15308

- Construction Exhaust Greenhouse Gasses Pollutant Emission Factors (g/hp-hour)

Factor	CH ₄	N ₂ O	CO ₂	CO ₂ e
<i>Pavers Composite [HP: 81] [LF: 0.42]</i>				
Emission Factors	0.02136	0.00427	526.53742	528.34436
<i>Paving Equipment Composite [HP: 89] [LF: 0.36]</i>				
Emission Factors	0.02141	0.00428	527.68636	529.49724
<i>Rollers Composite [HP: 36] [LF: 0.38]</i>				
Emission Factors	0.02381	0.00476	586.90234	588.91644

- Vehicle Exhaust & Worker Trips Criteria Pollutant Emission Factors (grams/mile)

Factor	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.26952	0.00154	0.14103	3.84122	0.00441	0.00390	0.05145
LDGT	0.22481	0.00192	0.18918	3.46257	0.00510	0.00451	0.04317
HDGV	0.78167	0.00430	0.65797	10.65810	0.02143	0.01896	0.09228
LDDV	0.10644	0.00125	0.15141	5.33268	0.00349	0.00321	0.01636
LDDT	0.21012	0.00143	0.48470	5.15564	0.00569	0.00524	0.01737
HDDV	0.12457	0.00427	2.47637	1.51837	0.05028	0.04626	0.06568
MC	2.63976	0.00182	0.67831	12.51787	0.02253	0.01993	0.05364

- Vehicle Exhaust & Worker Trips Greenhouse Gasses Emission Factors (grams/mile)

Factor	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01539	0.00507	325.63146	327.52624
LDGT	0.01543	0.00713	404.10371	406.61141
HDGV	0.05371	0.02608	905.72567	914.83256
LDDV	0.05264	0.00067	370.74398	372.26042
LDDT	0.04013	0.00098	421.66823	422.96444
HDDV	0.02658	0.16189	1270.04904	1318.95535
MC	0.11135	0.00299	394.07840	397.75399

2.5.4 Paving Phase Formula(s)

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * EF_{POL}) / 2000$$

- Construction Exhaust Emissions per Phase

$$CEE_{POL} = (NE * WD * H * HP * LF * EF_{POL} * 0.002205) / 2000$$

CEE_{POL}: Construction Exhaust Emissions (TONs)

NE: Number of Equipment

WD: Number of Total Work Days (days)

H: Hours Worked per Day (hours)

HP: Equipment Horsepower

LF: Equipment Load Factor

EF_{POL}: Emission Factor for Pollutant (g/hp-hour)

0.002205: Conversion Factor grams to pounds

2000: Conversion Factor pounds to tons

- Vehicle Exhaust Emissions per Phase

$$VMT_{VE} = PA * 0.25 * (1 / 27) * (1 / HC) * HT$$

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

PA: Paving Area (ft²)

0.25: Thickness of Paving Area (ft)

(1 / 27): Conversion Factor cubic feet to cubic yards (1 yd³ / 27 ft³)

HC: Average Hauling Truck Capacity (yd³)

(1 / HC): Conversion Factor cubic yards to trips (1 trip / HC yd³)

HT: Average Hauling Truck Round Trip Commute (mile/trip)

$$V_{POL} = (VMT_{VE} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Vehicle Exhaust Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Vehicle Exhaust On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Worker Trips Emissions per Phase

$$VMT_{WT} = WD * WT * 1.25 * NE$$

VMT_{WT}: Worker Trips Vehicle Miles Travel (miles)

WD: Number of Total Work Days (days)

WT: Average Worker Round Trip Commute (mile)

1.25: Conversion Factor Number of Construction Equipment to Number of Works

NE: Number of Construction Equipment

$$V_{POL} = (VMT_{WT} * 0.002205 * EF_{POL} * VM) / 2000$$

V_{POL}: Vehicle Emissions (TONs)

VMT_{VE}: Worker Trips Vehicle Miles Travel (miles)

0.002205: Conversion Factor grams to pounds

EF_{POL}: Emission Factor for Pollutant (grams/mile)

VM: Worker Trips On Road Vehicle Mixture (%)

2000: Conversion Factor pounds to tons

- Off-Gassing Emissions per Phase

$$VOC_P = (2.62 * PA) / 43560 / 2000$$

VOC_P: Paving VOC Emissions (TONs)

2.62: Emission Factor (lb/acre)

PA: Paving Area (ft²)

43560: Conversion Factor feet to acre (43560 ft² / acre)² / acre)

2000: Conversion Factor square pounds to TONs (2000 lb / TON)

3. Emergency Generator

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam

Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Backup Generators

- Activity Description:

Backup Generators

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes

End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.016949	PM 10	0.015248
SOx	0.014276	PM 2.5	0.015248
NOx	0.069863	Pb	0.000000
CO	0.046656	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.000281	CO2	6.986250
N2O	0.000056	CO2e	8.079750

3.2 Emergency Generator Assumptions

- Emergency Generator

Type of Fuel used in Emergency Generator: Diesel

Number of Emergency Generators: 3

- **Default Settings Used:** Yes

- Emergency Generators Consumption

Emergency Generator's Horsepower: 135 (default)
Average Operating Hours Per Year (hours): 30 (default)

3.3 Emergency Generator Emission Factor(s)

- Emergency Generators Criteria Pollutant Emission Factor (lb/hp-hr)

VOC	SO _x	NO _x	CO	PM 10	PM 2.5	Pb	NH ₃
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251	—	—

- Emergency Generators Greenhouse Gasses Pollutant Emission Factor (lb/hp-hr)

CH ₄	N ₂ O	CO ₂	CO ₂ e
0.000046297	0.000009259	1.15	1.33

3.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year

$$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$$

AE_{POL}: Activity Emissions (TONs per Year)
 NGEN: Number of Emergency Generators
 HP: Emergency Generator's Horsepower (hp)
 OT: Average Operating Hours Per Year (hours)
 EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

4. Tanks

4.1 General Information & Timeline Assumptions

- **Add or Remove Activity from Baseline?** Add

- Activity Location

County: Guam
Regulatory Area(s): NOT IN A REGULATORY AREA

- **Activity Title:** Jet Fuel

- Activity Description:

Jet Fuel

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

Indefinite: Yes
End Month: N/A

End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.298118	PM 10	0.000000
SOx	0.000000	PM 2.5	0.000000
NOx	0.000000	Pb	0.000000
CO	0.000000	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.000000	CO2	0.000000
N2O	0.000000	CO2e	0.000000

4.2 Tanks Assumptions

- Chemical

Chemical Name: Jet kerosene (JP-5, JP-8 or Jet-A)
Chemical Category: Petroleum Distillates
Chemical Density: 7
Vapor Molecular Weight (lb/lb-mole): 130
Stock Vapor Density (lb/ft³): 0.000170775135930213
Vapor Pressure: 0.00725
Vapor Space Expansion Factor (dimensionless): 0.068

- Tank

Type of Tank: Horizontal Tank
Tank Length (ft): 20
Tank Diameter (ft): 35
Annual Net Throughput (gallon/year): 2960000

4.3 Tank Formula(s)

- Vapor Space Volume

$$VSV = (PI / 4) * D^2 * L / 2$$

VSV: Vapor Space Volume (ft³)
 PI: PI Math Constant
 D²: Tank Diameter (ft)
 L: Tank Length (ft)
 2: Conversion Factor (Vapor Space Volume is assumed to be one-half of the tank volume)

- Vented Vapor Saturation Factor

$$VVSF = 1 / (1 + (0.053 * VP * L / 2))$$

VVSF: Vented Vapor Saturation Factor (dimensionless)
 0.053: Constant
 VP: Vapor Pressure (psia)
 L: Tank Length (ft)

- Standing Storage Loss per Year

$$SSL_{VOC} = 365 * VSV * SVD * VSEF * VVSF / 2000$$

SSL_{voc}: Standing Storage Loss Emissions (TONs)
365: Number of Daily Events in a Year (Constant)
VSV: Vapor Space Volume (ft³)
SVD: Stock Vapor Density (lb/ft³)
VSEF: Vapor Space Expansion Factor (dimensionless)
VVSF: Vented Vapor Saturation Factor (dimensionless)
2000: Conversion Factor pounds to tons

- Number of Turnovers per Year

$$NT = (7.48 * ANT) / ((PI / 4.0) * D * L)$$

NT: Number of Turnovers per Year
7.48: Constant
ANT: Annual Net Throughput
PI: PI Math Constant
D²: Tank Diameter (ft)
L: Tank Length (ft)

- Working Loss Turnover (Saturation) Factor per Year

$$WLSF = (18 + NT) / (6 * NT)$$

WLSF: Working Loss Turnover (Saturation) Factor per Year
18: Constant
NT: Number of Turnovers per Year
6: Constant

- Working Loss per Year

$$WL_{voc} = 0.0010 * VMW * VP * ANT * WLSF / 2000$$

0.0010: Constant
VMW: Vapor Molecular Weight (lb/lb-mole)
VP: Vapor Pressure (psia)
ANT: Annual Net Throughput
WLSF: Working Loss Turnover (Saturation) Factor
2000: Conversion Factor pounds to tons

5. Degreaser

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Degreasers

- Activity Description:

Degreasers

- Activity Start Date

Start Month: 1

Start Year: 2026

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	3.256500	PM 10	0.000000
SOx	0.000000	PM 2.5	0.000000
NOx	0.000000	Pb	0.000000
CO	0.000000	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.000000	CO2	0.000000
N2O	0.000000	CO2e	0.000000

5.2 Degreaser Assumptions

- Degreaser

Net solvent usage (total less recycle) (gallons/year): 1000

- Default Settings Used: Yes

- Degreaser Consumption

Solvent used: Mineral Spirits CAS#64475-85-0 (default)
Specific gravity of solvent: 0.78 (default)
Solvent VOC content (%): 100 (default)
Efficiency of control device (%): 0 (default)

5.3 Degreaser Formula(s)

- Degreaser Emissions per Year

$$DE_{VOC} = (VOC / 100) * NS * SG * 8.35 * (1 - (CD / 100)) / 2000$$

DE_{VOC}: Degreaser VOC Emissions (TONs per Year)
 VOC: Solvent VOC content (%)
 (VOC / 100): Conversion Factor percent to decimal
 NS: Net solvent usage (total less recycle) (gallons/year)
 SG: Specific gravity of solvent
 8.35: Conversion Factor the density of water
 CD: Efficiency of control device (%)
 (1 - (CD / 100)): Conversion Factor percent to decimal (Not effected by control device)
 2000: Conversion Factor pounds to tons

6. Personnel

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Personnel

- Activity Description:

Personnel

- Activity Start Date

Start Month: 1
 Start Year: 2026

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.382400	PM 10	0.007429
SOx	0.002547	PM 2.5	0.006573
NOx	0.221167	Pb	0.000000
CO	5.184852	NH3	0.065633

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.022573	CO2	538.324717
N2O	0.008793	CO2e	541.505471

6.2 Personnel Assumptions

- Number of Personnel

Active Duty Personnel: 205
 Civilian Personnel: 50
 Support Contractor Personnel: 0
 Air National Guard (ANG) Personnel: 0
 Reserve Personnel: 0

- Default Settings Used: Yes

- Average Personnel Round Trip Commute (mile): 20 (default)

- Personnel Work Schedule

Active Duty Personnel: 5 Days Per Week (default)
 Civilian Personnel: 5 Days Per Week (default)
 Support Contractor Personnel: 5 Days Per Week (default)
 Air National Guard (ANG) Personnel: 4 Days Per Week (default)
 Reserve Personnel: 4 Days Per Month (default)

6.3 Personnel On Road Vehicle Mixture

- On Road Vehicle Mixture (%)

Category	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
POVs	37.55	60.32	0	0.03	0.2	0	1.9
GOVs	54.49	37.73	4.67	0	0	3.11	0

6.4 Personnel Emission Factor(s)

- On Road Vehicle Criteria Pollutant Emission Factors (grams/mile)

Factor	VOC	SO _x	NO _x	CO	PM 10	PM 2.5	NH ₃
LDGV	0.24066	0.00152	0.12188	3.67987	0.00436	0.00385	0.04956
LDGT	0.20033	0.00188	0.15216	3.18088	0.00498	0.00441	0.04181
HDGV	0.70246	0.00431	0.58267	9.91727	0.02015	0.01783	0.09128
LDDV	0.10429	0.00124	0.14961	5.44568	0.00362	0.00333	0.01648
LDDT	0.16176	0.00141	0.42024	4.73661	0.00570	0.00524	0.01701
HDDV	0.11245	0.00420	2.33871	1.47151	0.04331	0.03984	0.06634
MC	2.63225	0.00182	0.67640	12.36904	0.02253	0.01993	0.05402

- On Road Vehicle Greenhouse Gasses Emission Factors (grams/mile)

Factor	CH ₄	N ₂ O	CO ₂	CO ₂ e
LDGV	0.01395	0.00489	320.84361	322.64634
LDGT	0.01330	0.00683	396.75609	399.12151
HDGV	0.05013	0.02628	909.14528	918.22168
LDDV	0.05272	0.00067	368.45987	369.97807
LDDT	0.03926	0.00099	416.19151	417.46714
HDDV	0.02632	0.16334	1251.47197	1300.80653
MC	0.10977	0.00298	394.18945	397.82058

6.5 Personnel Formula(s)

- Personnel Vehicle Miles Travel for Work Days per Year

$$VMT_p = NP * WD * AC$$

VMT_p: Personnel Vehicle Miles Travel (miles/year)

NP: Number of Personnel

WD: Work Days per Year

AC: Average Commute (miles)

- Total Vehicle Miles Travel per Year

$$VMT_{Total} = VMT_{AD} + VMT_C + VMT_{SC} + VMT_{ANG} + VMT_{AFRC}$$

VMT_{Total}: Total Vehicle Miles Travel (miles)

VMT_{AD}: Active Duty Personnel Vehicle Miles Travel (miles)

VMT_C: Civilian Personnel Vehicle Miles Travel (miles)

VMT_{SC}: Support Contractor Personnel Vehicle Miles Travel (miles)

VMT_{ANG}: Air National Guard Personnel Vehicle Miles Travel (miles)

VMT_{AFRC}: Reserve Personnel Vehicle Miles Travel (miles)

- Vehicle Emissions per Year

$$V_{POL} = (VMT_{Total} * 0.002205 * EF_{POL} * VM) / 2000$$

- V_{POL}: Vehicle Emissions (TONs)
- VMT_{Total}: Total Vehicle Miles Travel (miles)
- 0.002205: Conversion Factor grams to pounds
- EF_{POL}: Emission Factor for Pollutant (grams/mile)
- VM: Personnel On Road Vehicle Mixture (%)
- 2000: Conversion Factor pounds to tons

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: F-15 LTO Operations

- Activity Description:

F-15s were conservatively used for all rotational aircraft. which could be either F-15s or F16s.

- Activity Start Date

Start Month: 1
 Start Year: 2025

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	19.693265	PM 10	2.390680
SOx	3.721025	PM 2.5	2.149092
NOx	39.260943	Pb	0.000000
CO	69.272537	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.468432	CO2	11140.263224
N2O	0.091391	CO2e	11179.212275

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	19.693265	PM 10	2.390680
SOx	3.721025	PM 2.5	2.149092
NOx	39.260943	Pb	0.000000
CO	69.272537	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.468432	CO2	11140.263224
N2O	0.091391	CO2e	11179.212275

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-15E
Engine Model: F100-PW-220
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
Idle	2084.00	7.94	1.07	4.61	35.32	0.67	0.60
Approach	3837.00	5.12	1.07	12.50	1.92	0.70	0.63
Intermediate	5770.00	2.89	1.07	22.20	0.86	0.70	0.63
Military	9679.00	2.08	1.07	29.60	0.86	0.91	0.82
After Burn	41682.00	1.60	1.07	8.20	11.87	0.38	0.35

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	CH4	N2O	CO2	CO2e
Idle	2084.00	0.13	0.03	3203.44	3214.64
Approach	3837.00	0.13	0.03	3203.44	3214.64
Intermediate	5770.00	0.13	0.03	3203.44	3214.64
Military	9679.00	0.13	0.03	3203.44	3214.64
After Burn	41682.00	0.13	0.03	3203.44	3214.64

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		12
Flight Operation Cycle Type:	LTO (Landing and Takeoff)	
Number of Annual Flight Operation Cycles for all Aircraft:		2376
Number of Annual Trim Test(s) per Aircraft:		12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	21.2
Approach [Approach] (mins):	2.21
Climb Out [Intermediate] (mins):	0.66
Takeoff [Military] (mins):	0.78
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
—	—	—	—	—

7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
—	—	—	—	—	—	—	—

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH4	N2O	CO2	CO2e
—	—	—	—	—	—

7.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

- APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
- APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: F-15 TGO Operations

- Activity Description:

F-15s were conservatively used for all rotational aircraft, which could be either F-15s or F16s.

- Activity Start Date

Start Month: 1
 Start Year: 2025

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	1.804366	PM 10	0.371628
SOx	0.536685	PM 2.5	0.334563
NOx	9.970511	Pb	0.000000
CO	0.637642	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.067562	CO2	1606.766166
N2O	0.013181	CO2e	1612.383809

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	1.804366	PM 10	0.371628
SOx	0.536685	PM 2.5	0.334563
NOx	9.970511	Pb	0.000000
CO	0.637642	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.067562	CO2	1606.766166
N2O	0.013181	CO2e	1612.383809

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-15E
Engine Model: F100-PW-220
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
Idle	2084.00	7.94	1.07	4.61	35.32	0.67	0.60
Approach	3837.00	5.12	1.07	12.50	1.92	0.70	0.63
Intermediate	5770.00	2.89	1.07	22.20	0.86	0.70	0.63
Military	9679.00	2.08	1.07	29.60	0.86	0.91	0.82
After Burn	41682.00	1.60	1.07	8.20	11.87	0.38	0.35

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	CH4	N2O	CO2	CO2e
Idle	2084.00	0.13	0.03	3203.44	3214.64
Approach	3837.00	0.13	0.03	3203.44	3214.64
Intermediate	5770.00	0.13	0.03	3203.44	3214.64
Military	9679.00	0.13	0.03	3203.44	3214.64
After Burn	41682.00	0.13	0.03	3203.44	3214.64

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 12
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 1377
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	2.21
Climb Out [Intermediate] (mins):	1.58
Takeoff [Military] (mins):	0.44
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

8.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

- AE_{FOC}: Aircraft Emissions (TONs)
- AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
- AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
- AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)
- AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)
- AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Rotational KC-135 LTO Operations

- Activity Description:

Rotational KC-135 LTO Operations

- Activity Start Date

Start Month: 1
 Start Year: 2025

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.007109	PM 10	0.162895
SOx	0.120875	PM 2.5	0.146574
NOx	0.976044	Pb	0.000000
CO	0.767367	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.015217	CO2	361.884331
N2O	0.002969	CO2e	363.149566

- Activity Emissions of Criteria Pollutants [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.007109	PM 10	0.162895
SOx	0.120875	PM 2.5	0.146574
NOx	0.976044	Pb	0.000000
CO	0.767367	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [LTO Flight Operations (includes Trim Test & APU) part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.015217	CO2	361.884331
N2O	0.002969	CO2e	363.149566

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: KC-135R
Engine Model: F108-CF-100
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
Idle	1136.00	0.19	1.07	3.88	23.65	2.07	1.86
Approach	2547.00	0.06	1.07	5.73	8.57	1.55	1.40
Intermediate	5650.00	0.03	1.07	11.04	2.32	0.65	0.58
Military	6458.00	0.03	1.07	12.05	0.36	1.59	1.43
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	CH4	N2O	CO2	CO2e
Idle	1136.00	0.13	0.03	3203.44	3214.64
Approach	2547.00	0.13	0.03	3203.44	3214.64
Intermediate	5650.00	0.13	0.03	3203.44	3214.64
Military	6458.00	0.13	0.03	3203.44	3214.64
After Burn	0.00	0.13	0.03	3203.44	3214.64

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		1
Flight Operation Cycle Type:	LTO (Landing and Takeoff)	
Number of Annual Flight Operation Cycles for all Aircraft:		20
Number of Annual Trim Test(s) per Aircraft:		12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	14.7
Approach [Approach] (mins):	4.74
Climb Out [Intermediate] (mins):	1.17
Takeoff [Military] (mins):	1.18
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: Yes

- Auxiliary Power Unit (APU) (default)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer
—	—	—	—	—

9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Criteria Pollutant Emission Factors (lb/hr)

Designation	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
—	—	—	—	—	—	—	—

- Auxiliary Power Unit (APU) Greenhouse Gasses Emission Factors (lb/hr)

Designation	Fuel Flow	CH4	N2O	CO2	CO2e
—	—	—	—	—	—

9.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$$

- APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
- APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)
 LTO: Number of LTOs
 EF_{POL}: Emission Factor for Pollutant (lb/hr)
 2000: Conversion Factor pounds to tons

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: Rotational KC-135 TGO Operations

- Activity Description:

Rotational KC-135 TGO Operations

- Activity Start Date

Start Month: 1
 Start Year: 2025

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.000795	PM 10	0.020509
SOx	0.020872	PM 2.5	0.018437
NOx	0.179765	Pb	0.000000
CO	0.085890	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.002627	CO2	62.487206
N2O	0.000513	CO2e	62.705677

- Activity Emissions of Criteria Pollutants [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.000795	PM 10	0.020509
SOx	0.020872	PM 2.5	0.018437
NOx	0.179765	Pb	0.000000
CO	0.085890	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [CP Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.002627	CO2	62.487206
N2O	0.000513	CO2e	62.705677

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: KC-135R
Engine Model: F108-CF-100
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
Idle	1136.00	0.19	1.07	3.88	23.65	2.07	1.86
Approach	2547.00	0.06	1.07	5.73	8.57	1.55	1.40
Intermediate	5650.00	0.03	1.07	11.04	2.32	0.65	0.58
Military	6458.00	0.03	1.07	12.05	0.36	1.59	1.43
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	CH4	N2O	CO2	CO2e
Idle	1136.00	0.13	0.03	3203.44	3214.64
Approach	2547.00	0.13	0.03	3203.44	3214.64
Intermediate	5650.00	0.13	0.03	3203.44	3214.64
Military	6458.00	0.13	0.03	3203.44	3214.64
After Burn	0.00	0.13	0.03	3203.44	3214.64

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Flight Operation Cycle Type: CP (Close Pattern)
Number of Annual Flight Operation Cycles for all Aircraft: 16
Number of Annual Trim Test(s) per Aircraft: 0

- **Default Settings Used:** No

- **Flight Operations TIMs (Time In Mode)**

Taxi [Idle] (mins):	0
Approach [Approach] (mins):	5.16
Climb Out [Intermediate] (mins):	3.61
Takeoff [Military] (mins):	0.47
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- **Trim Test**

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

10.3.2 Flight Operations Formula(s)

- **Aircraft Emissions per Mode for Flight Operation Cycles per Year**

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- **Aircraft Emissions for Flight Operation Cycles per Year**

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- **Aircraft Emissions per Mode for Trim per Year**

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft
 NTT: Number of Trim Test
 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM}: Aircraft Emissions (TONs)
 AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
 AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
 AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
 AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
 AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
 Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: F-15 Destination Operations

- Activity Description:

F-15s were conservatively used for all rotational aircraft, which could be either F-15s or F16s.

- Activity Start Date

Start Month: 1
 Start Year: 2026

- Activity End Date

Indefinite: Yes
 End Month: N/A
 End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.000000	PM 10	0.000000
SOx	0.000000	PM 2.5	0.000000
NOx	0.000000	Pb	0.000000
CO	0.000000	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	3185.970413	CO2	58016.836270
N2O	3184.114591	CO2e	58208.546283

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.000000	PM 10	0.000000
SOx	0.000000	PM 2.5	0.000000
NOx	0.000000	Pb	0.000000
CO	0.000000	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	3185.970413	CO2	58016.836270
N2O	3184.114591	CO2e	58208.546283

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-15E
Engine Model: F100-PW-220
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
Idle	2084.00	7.94	1.07	4.61	35.32	0.67	0.60
Approach	3837.00	5.12	1.07	12.50	1.92	0.70	0.63
Intermediate	5770.00	2.89	1.07	22.20	0.86	0.70	0.63
Military	9679.00	2.08	1.07	29.60	0.86	0.91	0.82
After Burn	41682.00	1.60	1.07	8.20	11.87	0.38	0.35

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	CH4	N2O	CO2	CO2e
Idle	2084.00	0.13	0.03	3203.44	3214.64
Approach	3837.00	0.13	0.03	3203.44	3214.64
Intermediate	5770.00	0.13	0.03	3203.44	3214.64
Military	9679.00	0.13	0.03	3203.44	3214.64
After Burn	41682.00	0.13	0.03	3203.44	3214.64

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:		12
Flight Operation Cycle Type:	DC (Destination Cycle)	
Number of Annual Flight Operation Cycles for all Aircraft:		2376
Number of Annual Trim Test(s) per Aircraft:		0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	36
Approach [Approach] (mins):	69
Climb Out [Intermediate] (mins):	12
Takeoff [Military] (mins):	2.4
Takeoff [After Burn] (mins):	0.6

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

FOC: Number of Flight Operation Cycles (for all aircraft)

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

AEM_{APPROACH}: Aircraft Emissions for Approach Mode (TONs)

AEM_{CLIMBOUT}: Aircraft Emissions for Climb-Out Mode (TONs)

AEM_{TAKEOFF}: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

- AEPS_{POL}: Aircraft Emissions per Pollutant & Power Setting (TONs)
- TD: Test Duration (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- NA: Number of Aircraft
- NTT: Number of Trim Test
- 2000: Conversion Factor pounds to TONS

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

- AE_{TRIM}: Aircraft Emissions (TONs)
- AEPS_{IDLE}: Aircraft Emissions for Idle Power Setting (TONs)
- AEPS_{APPROACH}: Aircraft Emissions for Approach Power Setting (TONs)
- AEPS_{INTERMEDIATE}: Aircraft Emissions for Intermediate Power Setting (TONs)
- AEPS_{MILITARY}: Aircraft Emissions for Military Power Setting (TONs)
- AEPS_{AFTERBURN}: Aircraft Emissions for After Burner Power Setting (TONs)

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Guam
Regulatory Area(s): NOT IN A REGULATORY AREA

- Activity Title: KC-135 Destination GHG Emissions

- Activity Description:

KC-135 Destination GHG Emissions

- Activity Start Date

Start Month: 1
Start Year: 2026

- Activity End Date

Indefinite: Yes
End Month: N/A
End Year: N/A

- Activity Emissions of Criteria Pollutants:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.000000	PM 10	0.000000
SOx	0.000000	PM 2.5	0.000000

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
NOx	0.000000	Pb	0.000000
CO	0.000000	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.026954	CO2	641.028846
N2O	0.005259	CO2e	643.270038

- Activity Emissions of Criteria Pollutants [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
VOC	0.000000	PM 10	0.000000
SOx	0.000000	PM 2.5	0.000000
NOx	0.000000	Pb	0.000000
CO	0.000000	NH3	0.000000

- Global Scale Activity Emissions of Greenhouse Gasses [DC Flight Operations part]:

Pollutant	Emissions Per Year (TONs)	Pollutant	Emissions Per Year (TONs)
CH4	0.026954	CO2	641.028846
N2O	0.005259	CO2e	643.270038

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: KC-135R
Engine Model: F108-CF-100
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Criteria Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	VOC	SOx	NOx	CO	PM 10	PM 2.5
Idle	1136.00	0.19	1.07	3.88	23.65	2.07	1.86
Approach	2547.00	0.06	1.07	5.73	8.57	1.55	1.40
Intermediate	5650.00	0.03	1.07	11.04	2.32	0.65	0.58
Military	6458.00	0.03	1.07	12.05	0.36	1.59	1.43
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00

- Aircraft & Engine Greenhouse Gasses Pollutant Emission Factors (lb/1000lb fuel)

Factor	Fuel Flow	CH4	N2O	CO2	CO2e
Idle	1136.00	0.13	0.03	3203.44	3214.64
Approach	2547.00	0.13	0.03	3203.44	3214.64
Intermediate	5650.00	0.13	0.03	3203.44	3214.64
Military	6458.00	0.13	0.03	3203.44	3214.64
After Burn	0.00	0.13	0.03	3203.44	3214.64

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	12
Flight Operation Cycle Type:	DC (Destination Cycle)
Number of Annual Flight Operation Cycles for all Aircraft:	20
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi [Idle] (mins):	33.6
Approach [Approach] (mins):	73.2
Climb Out [Intermediate] (mins):	12
Takeoff [Military] (mins):	1.2
Takeoff [After Burn] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for Flight Operation Cycles per Year

$$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * FOC / 2000$$

- AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
- TIM: Time in Mode (min)
- 60: Conversion Factor minutes to hours
- FC: Fuel Flow Rate (lb/hr)
- 1000: Conversion Factor pounds to 1000pounds
- EF: Emission Factor (lb/1000lb fuel)
- NE: Number of Engines
- FOC: Number of Flight Operation Cycles (for all aircraft)
- 2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Flight Operation Cycles per Year

$$AE_{FOC} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$$

AE_{FOC} : Aircraft Emissions (TONs)

AEM_{IDLE_IN} : Aircraft Emissions for Idle-In Mode (TONs)

AEM_{IDLE_OUT} : Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)

60: Conversion Factor minutes to hours

FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines

NA: Number of Aircraft

NTT: Number of Trim Test

2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$$

AE_{TRIM} : Aircraft Emissions (TONs)

$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)

$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)

$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)

$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

F-2. Air Conformity Applicability Model Report Record of Air Analysis

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform a net change in emissions analysis to assess the potential air quality impact/s associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, *Environmental Compliance and Pollution Prevention*; the *Environmental Impact Analysis Process* (EIAP, 32 CFR 989); the *General Conformity Rule* (GCR, 40 CFR 93 Subpart B); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of the ACAM analysis. Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: ANDERSEN AFB
State: Guam
County(s): Guam
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: North Ramp Upgrades and F-15 Beddown at Andersen AFB

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2025

e. Action Description:

The DAF proposes to beddown and support the mission requirements of 12 RSAF F-15 fighter aircraft, and construct infrastructure upgrades at Andersen AFB, Guam, in support of DAF and DoD strategies and initiatives for the Indo-Pacific. Once construction is completed, the use of this infrastructure would be consistent with the types of operations currently occurring on the installation. The proposed infrastructure would have multiple uses, and could support both the F-15 beddown and other DAF, service component, and partner nation aircraft or missions operating from Andersen AFB now or in the future. The infrastructure would provide options for parking, storing, maintaining, refueling, loading, and unloading the F-15s and other aircraft on the installation, as well as storing munitions, which would improve upon current strategic capabilities and posture with regard to ground maneuverability. The F-15 beddown and proposed infrastructure each have standalone value for supporting the defense of U.S. interests in the Indo-Pacific region, in accordance with the Pacific Deterrence Initiative and as described in Purpose and Need for the Proposed Action.

2. Air Impact Analysis: Based on the attainment status at the action location, the requirements of the GCR are not applicable.

Total reasonably foreseeable net direct and indirect emissions associated with the action were estimated through ACAM on a calendar-year basis for the start of the action through achieving "steady state" (hsba.e., no net gain/loss in emission stabilized and the action is fully implemented) emissions. The ACAM analysis uses the latest and most accurate emission estimation techniques available; all algorithms, emission factors, and methodologies used are described in detail in the *USAF Air Emissions Guide for Air Force Stationary Sources*, the *USAF Air Emissions Guide for Air Force Mobile Sources*, and the *USAF Air Emissions Guide for Air Force Transitory Sources*.

"Insignificance Indicators" were used in the analysis to provide an indication of the significance of the proposed Action's potential impacts to local air quality. The insignificance indicators are trivial (de minimis) rate thresholds that have been demonstrated to have little to no impact to air quality. These insignificance indicators are the 250 ton/yr Prevention of Significant Deterioration (PSD) major source threshold and 25 ton/yr for lead for actions occurring in areas that are "Attainment" (hsba.e., not exceeding any National Ambient Air Quality Standard (NAAQS)). These indicators do not define a significant impact; however, they do provide a threshold to identify actions that are insignificant. Any action with net emissions below the insignificance indicators for all criteria

**HQ PACAF | Final Environmental Impact Statement
for F-15 Beddown and Infrastructure Upgrades at Andersen AFB**
APPENDIX F: AIR QUALITY ANALYSIS SUPPORTING DOCUMENTATION

pollutants is considered so insignificant that the action will not cause or contribute to an exceedance on one or more NAAQS. For further detail on insignificance indicators, refer to *Level II, Air Quality Quantitative Assessment, Insignificance Indicators*.

The action’s net emissions for every year through achieving steady state were compared against the Insignificance Indicators and are summarized below.

Construction Emissions (Compressed into a single year) NOT IN A REGULATORY AREA

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
VOC	26.990	250	No
NOx	85.821	250	No
CO	91.152	250	No
SOx	4.437	250	No
PM 10	50.438	250	No
PM 2.5	3.879	250	No
Pb	0.000	25	No
NH3	0.169	250	No

Note: Includes concrete batch plant emissions.

Operational Emissions (Steady State) NOT IN A REGULATORY AREA

Pollutant	Action Emissions (ton/yr)	INSIGNIFICANCE INDICATOR	
		Indicator (ton/yr)	Exceedance (Yes or No)
VOC	25.460	250	No
NOx	50.678	250	No
CO	75.995	250	No
SOx	4.416	250	No
PM 10	2.968	250	No
PM 2.5	2.670	250	No
Pb	0.000	25	No
NH3	0.066	250	No

None of the estimated annual net emissions associated with this action are above the insignificance indicators; therefore, the action will not cause or contribute to an exceedance of one or more NAAQSs and will have an insignificant impact on air quality. No further air assessment is needed.

F-3. Air Conformity Applicability Model Report Greenhouse Gas (GHG) Emissions

1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to estimate GHG emissions and assess the theoretical Social Cost of Greenhouse Gases (SC GHG) associated with the action. The analysis was performed in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the *USAF Air Quality Environmental Impact Analysis Process (EIAP) Guide*. This report provides a summary of GHG emissions and SC GHG analysis.

Report generated with ACAM version: 5.0.23a

a. Action Location:

Base: ANDERSEN AFB
State: Guam
County(s): Guam
Regulatory Area(s): NOT IN A REGULATORY AREA

b. Action Title: North Ramp Upgrades and F-15 Beddown at Andersen AFB

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2025

e. Action Description:

The DAF proposes to beddown and support the mission requirements of 12 RSAF F-15 fighter aircraft, and construct infrastructure upgrades at Andersen AFB, Guam, in support of DAF and DoD strategies and initiatives for the Indo-Pacific. Once construction is completed, the use of this infrastructure would be consistent with the types of operations currently occurring on the installation. The proposed infrastructure would have multiple uses, and could support both the F-15 beddown and other DAF, service component, and partner nation aircraft or missions operating from Andersen AFB now or in the future. The infrastructure would provide options for parking, storing, maintaining, refueling, loading, and unloading the F-15s and other aircraft on the installation, as well as storing munitions, which would improve upon current strategic capabilities and posture with regard to ground maneuverability. The F-15 beddown and proposed infrastructure each have standalone value for supporting the defense of U.S. interests in the Indo-Pacific region, in accordance with the Pacific Deterrence Initiative and as described in Purpose and Need for the Proposed Action.

2. Analysis: Total combined direct and indirect GHG emissions associated with the action were estimated through ACAM on a calendar-year basis from the action start through the expected life cycle of the action. The life cycle for Air Force actions with "steady state" emissions (SS, net gain/loss in emission stabilized and the action is fully implemented) is assumed to be 10 years beyond the SS emissions year or 20 years beyond SS emissions year for aircraft operations related actions.

GHG Emissions Analysis Summary:

GHGs produced by fossil-fuel combustion are primarily carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (NO₂). These three GHGs represent more than 97 percent of all U.S. GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO₂ equivalents (CO₂e). All GHG emissions estimates were derived from various emission sources using the methods, algorithms, emission factors, and GWPs from the most current Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and/or Air Emissions Guide for Air Force Transitory Sources.

The Air Force has adopted the Prevention of Significant Deterioration (PSD) threshold for GHG of 75,000 ton per year (ton/yr) of CO₂e (or 68,039 metric ton per year [mton/yr]) as an indicator or "threshold of insignificance" for NEPA air quality impacts in all areas. This indicator does not define a significant impact; however, it provides a threshold to identify actions that are insignificant (de minimis, too trivial or minor to merit consideration). Actions with a net change in GHG (CO₂e) emissions below the insignificance indicator (threshold) are considered too insignificant on a global scale to warrant any further analysis. Note that actions with a net change in GHG (CO₂e) emissions above the insignificance indicator (threshold) are only considered potentially significant and require further assessment to determine if the action poses a significant impact. For further detail on insignificance indicators see Level II, Air Quality Quantitative Assessment, Insignificance Indicators (April 2023).

The following table summarizes the action-related GHG emissions on a calendar-year basis through the projected life cycle of the action. The following U.S. and State's GHG emissions estimates (next two tables) are based on a five-year average (2016 through 2020) of individual state-reported GHG emissions (Reference: State Climate Summaries 2022, NOAA National Centers for Environmental Information, National Oceanic and Atmospheric Administration. <https://statesummaries.ncics.org/downloads/>).

Action-Related Annual GHG Emissions (mton/yr)

YEAR	CO ₂	CH ₄	N ₂ O	CO ₂ e	Threshold	Exceedance
2025	16,365	0.63042558	0.44736762	16,514	68,039	No
2026-2047	65,657	2890.81218845	2888.69181942	65,879	68,039	No

State's Annual GHG Emissions (mton/yr)

YEAR	CO ₂	CH ₄	N ₂ O	CO ₂ e
2025	100,714,788	502,488	28,860	101,246,136
2026-2047	100,714,788	502,488	28,860	101,246,136

U.S. Annual GHG Emissions (mton/yr)

YEAR	CO ₂	CH ₄	N ₂ O	CO ₂ e
2025	5,136,454,179	25,626,912	1,500,708	5,163,581,798
2026-2047	5,136,454,179	25,626,912	1,500,708	5,163,581,798

GHG Relative Significance Assessment:

A Relative Significance Assessment uses the rule of reason and the concept of proportionality along with the consideration of the affected area (yGba.e., global, national, and regional) and the degree (intensity) of the proposed action's effects. The Relative Significance Assessment provides real-world context and allows for a reasoned choice against alternatives through a relative comparison analysis. The analysis weighs each alternative's annual net change in GHG emissions proportionally against (or relative to) global, national, and regional emissions.

The action's surroundings, circumstances, environment, and background (context associated with an action) provide the setting for evaluating the GHG intensity (impact significance). From an air quality perspective, context of an action is the local area's ambient air quality relative to meeting the NAAQSs, expressed as attainment, nonattainment, or maintenance areas (this designation is considered the attainment status). The action-related GHGs generally have a insignificant impact to local air quality.

To provide real-world context to the GHG and climate change effects on a global scale, an action's net change in GHG emissions is compared relative to the state (where action will occur) and U.S. annual emissions. The following table provides a relative comparison of an action's net change in GHG emissions vs. state and U.S. projected GHG emissions for the same time period.

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Total GHG Relative Significance (mton)

Year	Category	CO2	CH4	N2O	CO2e
2025–2047	State Total	2,316,440,124	11,557,235	663,775	2,328,661,133
2025–2047	U.S. Total	118,138,446,117	589,418,969	34,516,276	118,762,381,361
2025–2047	Action	1,460,822	63598.498571	63551.667395	1,465,846
—	Percent of State Totals	0.06306324%	0.55029166%	9.57428530%	0.06294804%
—	Percent of U.S. Totals	0.00123653%	0.01079003%	0.18412087%	0.00123427%

From a global context, the action's total GHG percentage of total global GHG for the same time period is: 0.00016539%.*

* Global value based on the U.S. emits 13.4% of all global GHG annual emissions (2018 Emissions Data, Center for Climate and Energy Solutions, accessed 7-6-2023, <https://www.c2es.org/content/international-emissions>).

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