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SPECIES LISTS – TERRESTRIAL AND MARINE

English/Chamorro Name	Scientific Name
PLANTS	
- /Aabang	*Eugenia* spp.
- /Ahgao	*Premna obtusifolia*
- /Chopak	*Mammea odorata*
- /Fago, fagot	*Neisosperma oppositifolia*
- /Faia	*Tristiropsis obtusangula*
- /Faniok	*Merrilliodendron megacarpum*
- /Gausali	*Bikkia tetrandra*
- /Ifit	*Intsia bijunga*
- /Langiti	*Ochrosia mariannesis*
- /Luluhot	*Maytenus thompsonii*
- /Mapunao	*Aglaia mariannensis*
- /Panao	*Claoxylon marianum*
- /Talisai	*Terminalia catappa*
- /Taupun ayuyu	*Elatostema calcareum*
- /Ufa halomtano	*Heritiera longipetiolata*
- /Yoga, yogga, joga	*Elaeocarpus joga*
Betelnut/Pugua	*Areca catechu*
Breadfruit/Lemmai	*Artocarpus altilis*
Coconut palm/Niyog	*Cocos nucifera*
Cycad/Fadang	*Cycas micronesica*
Fig/ -	*Ficus* spp.
Hibiscus/Pago	*Hibiscus tiliaceus*
Ironwood or Australian pine/Gago or gagu	*Casuarina equisetifolia*
Macadamia nut tree/Pengua	*Macadamia integrifolia*
Pandanus/Kafu, kafa	*Pandanus* spp.
Papaya/Papaya	*Carica papaya*
Serianthes tree or fire tree/ Hayun lago	*Serianthes nelsonii*
Tangantangan/Tangantangan	*Leucaena leucocephala*
Tree fern/Tsatsa	*Cyathea lunulata*
Vitex/ -	*Vitex parviflora*
INVERTEBRATES	
Asian cycad scale/ -	*Aulacaspis yasumatsui*
Coconut rhinoceros beetle/-	*Oryctes rhinoceros*
coral/ -	*Acanthastrea spp.*
coral/ -	*Acropora* spp.
coral/ -	*Aleveopora* spp.
coral/ -	*Astreopora cucullata*
coral/ -	*Euphyllia* spp.
coral/ -	*Millepora tuberosa*
coral/ -	*Montipora* spp.
coral/ -	*Pavona diffluens* spp.
coral/ -	*Pectinia alcicornis*
coral/ -	*Pocillopora danae*
coral/ -	*Pocillopora elegans*
coral/ -	*Porites horizontalata*
coral/ -	*Seriatopora aculeata*
Coconut crab/Ayuyu	*Birgus latro*
Crown-of-thorns starfish/ -	*Acanthaster planci*
Cycad blue butterfly/-	*Chilades pandava*
Fragile tree snail/Akaleha'	*Samoana fragilis*
Guam tree snail/Akaleha'	*Partula radiolata*
Humped tree snail/Akaleha'	*Partula gibba*
Mangrove crab/ -	*Scylla serrata*
Mariana eight-spot butterfly/ Ababang	*Hypolimnas octucula mariannensis*
Mariana wandering butterfly/Ababang	*Vagrans egistina*
Nerite snail/-	*Neritina pulligera*
Shrimp/-	*Atyoida* sp.

English/Chamorro Name	Scientific Name
Shrimp/-	*Caridina* sp.
Spiny lobster/Mahongang	*Panulirus marginatus*
Sponge, puff or yellow tough	*Neofibularia hartmani*
Thiarid snail/-	*Stenomelania plicaria*
FISH	
Bighead catfish/ -	*Clarias macrocephalus*
Guam goby/Atot	*Awaous guamensis*
Bumphead parrotfish/Atuhong	*Bolbometopon muricatum*
Goby/Atot	*Stiphodon* sp.
Humphead or Naploean wrasse/Tanguisson	*Cheilinus undulatus*
Reticulate moray eel	*Muraena retifera*
Flagtail/Umatang	*Kuhlia rupestris*
Mosquito fish/-	*Gambusia affinis*
Peacock bass/-	*Bairdiella ronchus*
Scalloped hammerhead/ -	*Sphyrna lewini*
Snapper/-	*Lutjanus* spp.
Walking catfish	*Clarias batrachus*
Yellow tail rock-climbing goby	*Sicyopterus macrostetholepis*
REPTILES AND AMPHIBIANS	
Brown treesnake/Kolepbla	*Boiga irregularis*
Marine or cane toad/Kairo	*Chaunus (Bufo) marinus*
Crab-eating frog/ -	*Fejervarya cancrivora*
Curious skink/ Guali'ek halom tano'	*Carlia fusca*
Eastern dwarf tree frog/ -	*Litoria fallax*
Greenhouse frog/ -	*Eleutherodactylus planirostris*
Green sea turtle/Haggan betde	*Chelonia mydas*
Gunther's Amoy frog/ -	*Sylvirana guentheri*
Hawksbill sea turtle/Hagan karai	*Eretmochelys imbricata*
Hong Kong whipping frog/ -	*Polypedates megacephalus*
House gecko/Guali'ek	*Hemidactylus frenatus*
Leatherback sea turtle	*Eretmochelys imbricata*
Monitor lizard/Hilatai	*Varanus indicus*
Marine toad/-	*Bufo marinus*
Moth skink/Guali'ek halom tano'	*Lipinia noctua*
Mourning gecko/Guali'ek	*Lepidodactylus lugubrus*
Mutilating gecko/Guali'ek	*Gehyra mutilata*
Pacific blue-tailed skink/ Guali'ek halom tano'	*Emoia caeruleocauda*
Pacific slender-toed gecko/Guali'ek	*Nactus pelagicus*
BIRDS	
Pacific golden plover/Dulili	*Pluvialis fulva*
Barn swallow/ -	*Hirundo rustica*
Black drongo/Salin Taiwan	*Dicrurus macrocercus*
Black francolin/ -	*Francolinus francolinus*
Fairy tern/ -	*Sternus nereis*
Fork-tailed swift/ -	*Apus pacificus*
Gray-tailed tattler/Dulili	*Heteroscelus brevipes*
Guam Micronesian kingfisher/Sihek	*Halcyon cinnamomina cinnamomina*
Guam rail/Ko'ko	*Rallus owstoni*
Island collared dove/Paluman senesa	*Streptopelia bitorquata*
King quail/-	*Coturnix chinensis*
Little egret/ -	*Egretta garzetta*

English/Chamorro Name	*Scientific Name*
Mariana common moorhen/Palattat	*Gallinula chloropus guami*
Mariana crow/Aga	*Corvus kubaryi*
Mariana swiftlet/Yayaguak	*Aerodramus bartschi*
Micronesian starling/Sali	*Aplonis opaca guami*
Pacific reef heron/ Chuchuko atilong	*Egretta sacra*
Ruddy turnstone/Dulili	*Arenaria interpres*
Ruff/ -	*Philomachus pugnax*
Sharp-tailed sandpiper/ -	*Calidris acuminata*
White tern/Chunge'	*Gygis alba*
White-throated ground dove	*Gallicolumba xanthonura*
Yellow bittern/Kakkak	*Ixobrychus sinensis*

English/Chamorro Name	*Scientific Name*
Wandering tattler/Dulili	*Tringa incana*
Whimbrel/Kalalang	*Numenius phaeopus*
Wood sandpiper/ -	*Tringa glareola*
MAMMALS	
Feral cat/ -	*Felis catus*
Feral dog/ -	*Canis familiaris*
Mariana fruit bat/Fanihi	*Pteropus m. mariannus*
Philippine deer/Binadu	*Rusa marianna*
Water buffalo/Karabao	*Bubalus bubalis*
Feral pig/Babuen halumtano	*Sus scrofa*

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Wilson, D.E. and D.M. Reeder, eds. 2005. Mammal Species of the World. Third Edition. http://www.departments.bucknell.edu/biology/resources/msw3/. Accessed December 5, 2013.

SPECIES PROFILES – TERRESTRIAL AND MARINE

Common Name: Coconut crab

Chamorro Name: Ayuyu

Scientific Name: *Birgus latro*

SPECIES DESCRIPTION

The largest terrestrial crab, and the most terrestrial of the decapod crustaceans due to well-developed thoracic lungs. Considered a hermit crab, but only use the shell of other mollusks during very early life stages. Body color varies between shades of light violet to deep purple to brown. Body length can be up to 16 in (400 mm) and weight on the order of 8.8 lbs (4 kg). Males and females are difficult to distinguish from one another, but males are generally larger.[1]

THREATS

Threats include overharvesting and modification of habitat. Highly prized as a food item, as large body size provides substantial amounts of flesh. Commercial interest has led to declining numbers.[1]

ECOLOGY

Found on land after the juvenile phase. Older juveniles begin the move from water, and adults only visit the ocean to hatch eggs and drink seawater as needed. Forage for fruits, nuts, and seeds, and occasionally eat dead animals.[2] Individuals hide and rest during the day and emerge at night to feed. Eggs are hatched in the ocean where the larvae are planktonic. Lifespan is thought to be around 30-40 years.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Found on oceanic islets and atolls and along the coasts of islands in the tropical Indo-Pacific area.[1] This species occurs regularly on Guam and the CNMI.[3]

REFERENCES

1. Schiller, C. 1992. Assessment of the status of the coconut crab *Birgus latro* on Niue Island with recommendations regarding an appropriate resource management strategy. South Pacific Aquaculture Development Project. Suva, Fiji. http://www.fao.org/docrep/field/003/AC281E/AC281E00.HTM.
2. Wilde, J.E., S.M. Linton, and P.G. Greenaway. 2004. Dietary assimilation and digestive strategy of the omnivorous anomuran land crab *Birgus latro* (Coenobitidae). Journal of Comparative Physiology and Biology 174:299-308.
3. CNMI DFW. 2009. Game Species: Coconut Crab. ftp://ftp-fc.sc.egov.usda.gov/GU/features/land_animals/CNMI/Coconut_Crab.PDF.

Photo:http://media-2.web.britannica.com/eb-media/58/125658-004-25041ADE.jpg.
Map: http://www.fao.org/docrep/field/003/AC281E/AC281E06.jpg.

Common Name: Mariana eight-spot butterfly, Forest flicker

Chamorro Name: Ababang

Scientific Name: *Hypolimnas octucula mariannensis*

SPECIES DESCRIPTION

A very rare butterfly, endemic to the islands of Guam and Saipan. Body color is primarily orange and black, with differences exhibited by males and females. Males are black with an orange stripe on each wing, and small black dots accompanying the stripe on the hindwings. Females are more orange overall, and display black bands scattered with white dots across the top of both pairs of wings. Males are smaller than females by at least a third in body size.[1]

LISTING STATUS

A federal candidate for listing under the federal ESA.[2] In Guam, considered a Species of Greatest Conservation Need.[3]

THREATS

Threats include habitat degradation and removal, competition from introduced butterfly species, disease, predation by ants, and parasitism by wasps.[1]

ECOLOGY

Larvae feed on two native host plants, *Procris pedunculata* and *Elatostema calcareum*, that grow only on karst limestone.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Historically, found on Guam and Saipan but now only occurs with any certainty on Guam.[1]

REFERENCES

1. USFWS. 2012. Species Assessment and Listing Priority Assignment Form: *Hypolimnas octucula mariannensis*, Mariana Eight-Spot Butterfly. Pacific Islands Fish and Wildlife Office, Honolulu, HI. April 15.

2. USFWS. 2013. Endangered and threatened wildlife and plants; review of native species that are candidates for listing as endangered and threatened; annual notice of findings on resubmitted petitions; annual description of progress on listing actions. Federal Register 78:70104-70162.

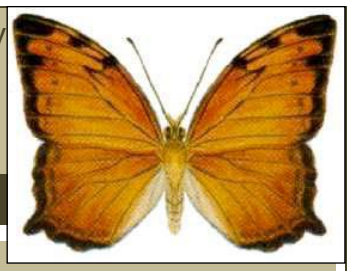
3. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: http://www.botany.hawaii.edu/basch/uhnpscesu/htms/parkrota/butterfly.htm#top.

Common Name: Mariana wandering butterfly, Marianas rusty

Chamorro Name: Ababang

Scientific Name: *Vagrans egestina*



SPECIES DESCRIPTION

A very rare butterfly, endemic to the islands of Guam and Rota. Body color is primarily orange and black, with black bordering the wings. A large orange irregular shape extends from the forewings to the hindwings. Females and males are similar in body color and size.[1]

LISTING STATUS

A federal candidate for listing under the federal ESA.[2] In Guam, considered a Species of Greatest Conservation Need.[3]

THREATS

Threats include habitat degradation and removal, competition from introduced butterfly species, disease, predation by ants, and parasitism by wasps.[1]

ECOLOGY

Larvae feed on a single host plant species (*Maytenus thompsonii*) that is endemic to the Mariana Islands. Adults are good fliers and can move considerable distances.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Historically found on Guam and CNMI (Rota), but now considered extirpated from Guam and currently only occurs on Rota.[1]

REFERENCES

1. USFWS. 2013. Species Assessment and Listing Priority Assignment Form: *Vagrans egistina*, Mariana Wandering Butterfly. Pacific Islands Fish and Wildlife Office, Honolulu, HI. June 1.

2. USFWS. 2013. Endangered and threatened wildlife and plants; review of native species that are candidates for listing as endangered and threatened; annual notice of findings on resubmitted petitions; annual description of progress on listing actions. Federal Register 78:70104-70162.

3. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: Schreiner, I.H. and D.M. Nafus. 1997. Butterflies of Micronesia. Agricultural Experiment Station, College of Agriculture and Life Sciences, University of Guam.

Common Name: Guam tree snail, Pacific tree snail

Chamorro Name: Akaleha'

Scientific Name: *Partula radiolata*

SPECIES DESCRIPTION

Endemic to Guam, this species is a small snail. The shell is slightly oblong with a conical shape, and has five whorls that are slightly convex. Shell color is pale yellow with dark axial rays and brown lines. Body size is approximately 0.8 in (19 mm) in length, with a shell diameter of 0.4 in (10 mm).[1]

LISTING STATUS

Listed as endangered under the Guam ESA[5] and a federal candidate for federal ESA listing.[2] Listed as critically endangered globally by the IUCN.[3] In Guam, also considered a Species of Greatest Conservation Need.[4]

THREATS

Threats include habitat degradation and removal, predation by native and introduced flatworms and other snails, and typhoons negatively impacting the forest.[1]

ECOLOGY

Preferred habitat is cool, shaded forest with high humidity. These snails also prefer subcanopy vegetation. Diet consists of decaying material, and foraging occurs primarily at night. Life history includes hermaphroditism, with reproduction occurring within the first year of life. Lifespan is thought to be up to 5 years. This species gives birth to live young.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically and currently on Guam.[1]

REFERENCES

1. USFWS. 2012. Species Assessment and Listing Priority Assignment Form: *Partula radiolata*, Guam Tree Snail. Pacific Islands Fish and Wildlife Office, Honolulu, HI. April 15.

2. USFWS. 2013. Endangered and threatened wildlife and plants; review of native species that are candidates for listing as endangered and threatened; annual notice of findings on resubmitted petitions; annual description of progress on listing actions. Federal Register 78:70104-70162.

3. Mollusc Specialist Group. 1996. *Partula radiolata*. *In* IUCN Red List of Threatened Species. Version 2013.2. www.iucnredlist.org. Accessed December 5, 2013.

4. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

5. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

Photo: http://www2.hawaii.edu/~capers/PacEco/wesa/pacSnails.html.

Common Name: Humped tree snail, Mariana Islands tree snail

Chamorro Name: Akaleha'

Scientific Name: *Partula gibba*

SPECIES DESCRIPTION

Named for the enlarged last whorl of its shell forming a "hump". The shell is a conical shape, and has four to four and a half whorls. Primary shell color is chestnut brown to whitish yellow, and occasionally purple. All forms are accented by white or brown lines along the suture between shell whorls.[1]

LISTING STATUS

Listed as endangered under the Guam ESA[5] and a candidate for federal ESA listing.[2] Listed as critically endangered by the IUCN.[3] On Guam, also considered a Species of Greatest Conservation Need.[4]

THREATS

Threats include habitat degradation and removal, predation by native and introduced flatworms and other snails, and typhoons negatively impacting the forest.[1]

ECOLOGY

Preferred habitat is cool, shaded forest with high humidity. These snails also prefer subcanopy vegetation. Diet consists of decaying material, and foraging occurs primarily at night. Life history includes hermaphroditism, with reproduction occurring within the first year of life. Lifespan is thought to be up to 5 years. This species gives birth to live young. [1]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically on Guam and numerous islands within the CNMI including Rota, Aguiguan, Tinian, Saipan, Anatahan, Sarigan, Alamagan, and Pagan. At present, found in the areas listed above, with the exception of Anatahan, where the species is thought to be extirpated.[1]

REFERENCES

1. USFWS. 2012. Species Assessment and Listing Priority Assignment Form: *Partula gibba*, Humped Tree Snail. Pacific Islands Fish and Wildlife Office, Honolulu, HI. April 15.
2. USFWS. 2013. Endangered and threatened wildlife and plants; review of native species that are candidates for listing as endangered and threatened; annual notice of findings on resubmitted petitions; annual description of progress on listing actions. Federal Register 78:70104-70162.
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4. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.
5. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

Photo: http://www2.hawaii.edu/~capers/PacEco/wesa/pacSnails.html.

Common Name: Mariana Islands fragile tree snail

Chamorro Name: Akaleha'

Scientific Name: *Samoana fragilis*

SPECIES DESCRIPTION

Named for its thin, semi-transparent shell making the animal appear "fragile". The shell is a conical shape, and has four whorls that spiral to the right. Primary shell color is buff, and other markings are created by internal organs visible through the shell. Shell size is 0.5-0.6 in (12-16 mm) long and 0.4-0.5 in (10-12 mm) wide.[1]

LISTING STATUS

Listed as endangered under the Guam ESA[5] and a candidate for federal ESA listing.[2] Listed as critically endangered by the IUCN.[3] In Guam, also considered a Species of Greatest Conservation Need.[4]

THREATS

Threats include habitat degradation and removal, predation by native and introduced flatworms and other snails, and typhoons negatively impacting the forest.[1]

ECOLOGY

Preferred habitat is cool, shaded forest with high humidity. These snails also prefer subcanopy vegetation. Diet consists of decaying material, and foraging occurs primarily at night. Adults are sexually mature before reaching maximum shell size. Eggs are large and tough, and are reabsorbed before the snail gives birth to live young. Lifespan is thought to be up to 5 years.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically and currently on Guam and the CNMI (Rota).[1]

REFERENCES

1. USFWS. 2012. Species Assessment and Listing Priority Assignment Form: *Samoana fragilis*, Fragile Tree Snail. Pacific Islands Fish and Wildlife Office, Honolulu, HI. April 15.

2. USFWS. 2013. Endangered and threatened wildlife and plants; review of native species that are candidates for listing as endangered and threatened; annual notice of findings on resubmitted petitions; annual description of progress on listing actions. Federal Register 78:70104-70162.

3. Mollusc Specialist Group. 2000. *Samoana fragilis*. *In* IUCN Red List of Threatened Species. Version 2013.2. www.iucnredlist.org. Accessed December 5, 2013.

4. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

5. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

Photo: http://www2.hawaii.edu/~capers/PacEco/wesa/pacSnails.html.

Common Name: Tree fern

Chamorro Name: Tsatsa

Scientific Name: *Cyathea lunulata*

SPECIES DESCRIPTION

An extremely rare organism, this tree fern is fairly large with a physical appearance typical of tree ferns. This species has a tall trunk (on average 26.2-32.8 ft [8-10 m]) and giant leaves.[1]

LISTING STATUS

On Guam, considered a Species of Greatest Conservation Need.[2] All tree ferns in the genus *Cyathea* are listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Appendix II. Appendix II lists species that are not currently threatened with extinction but that may become so unless trade is closely controlled.[3]

THREATS

Threats include typhoons and wildland fires which reduce available habitat.[1]

ECOLOGY

Preferred habitat is on hills, wet ravines and muddy drainage slopes.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Indigenous in Micronesia and Polynesia.[3] In Guam, it is found in the southern hills.[1, 4]

REFERENCES

1. Stone, B.C. 1970. The flora of Guam. Micronesica 6:1-659.

2. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

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4. Moore, P.H. and P. McMakin. 2001. Plants of Guam (I Tinanom Guahan Siha). Portable Extension Office for Program Literature Exchange (PEOPLE), Publications for Sustainable Extension Efforts on Tropical Islands. http://university.uog.edu/cals/people/. Last updated April 29, 2001; accessed December 12, 2013.

Photo: http://www.tropicalcentre.com/boomvarens/cyathealunulata/cyathealunulata3.jpg.

Common Name: Cycad

Chamorro Name: Fadang

Scientific Name: *Cycas micronesica*

SPECIES DESCRIPTION

A cycad reaching heights of 26-39 ft (8-12 m). Leaves are deep green, highly glossy, and constructed of tough tissue. Seeds are flattened and long, reaching 2.4 in (60 mm). Pollen cones are orange.[1]

LISTING STATUS

Listed as endangered by the IUCN and a Species of Greatest Conservation Need by GDAWR.[2, 3]

THREATS

The most serious threats are introduced pests, including the Asian diapsid scale. This insect voraciously infests and kills the plant. Other threats include the cycad blue butterfly eating the leaves, habitat destruction, direct removal of plants, and reduced numbers of the Mariana fruit bat.[2, 4]

ECOLOGY

Preferred habitat is in closed forest country, coral limestone or coral sand. Insects transfer pollen, and in effect make seeds for reproduction.[1, 3]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically in Micronesia, the Mariana Islands group, and the western Caroline Islands. Current population on Guam is in significant decline; populations on other Mariana Islands are unknown.[2, 5]

REFERENCES

1. Hill, K.D. 1994. *Cycas micronesica*. Australian Systematic Botany 7:554-556.

2. Marler, T., J. Haynes, and A. Lindstrom. 2010. *Cycas micronesica*. *In* IUCN Red List of Threatened Species. Version 2013.2. www.iucnredlist.org. Accessed December 5, 2013.

3. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

4. WPTRC. 2007. Western Pacific Tropical Research Center News. University of Guam. http://www.wptrc.org/article.asp?artID=35. August 31.

5. Marler, T.W. and J.H. Lawrence. 2012. Demography of *Cycas micronesica* on Guam following introduction of the armoured scale *Aulacaspis yasumatsui*. Journal of Tropical Ecology 28:233-242.

Photo: T. Marler

Common Name:

Chamorro Name: Ufa-halomtano

Scientific Name: *Heritiera longipetiolata*

SPECIES DESCRIPTION

A tall tree reaching heights of 40 ft (12 m). The bark is mottled brown in color. Leaves are silvery below and dark green above. Roots are massive and grow above-ground. The fruit is approximately 2-3 in (51-76 mm) long and 2 in (51 mm) wide.[1]

LISTING STATUS

Listed as endangered under the Guam ESA.[4] On Guam, also considered a Species of Greatest Conservation Need.[5] Previously considered a candidate species for listing under the federal ESA, but in 1990 removed as a candidate species because it was more abundant and widespread than previously believed and not subject to the degree of threats to warrant candidate status.[3] Listed as vulnerable by the IUCN.[2]

THREATS

The most serious threats are habitat loss and that pollinator-controls are affected by the non-native brown treesnake.[1]

ECOLOGY

Habitat is moist forest on limestone cliffs and coastal sites with windy conditions.[2]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically on Guam, Rota, Saipan and Tinian. Currently trees have been confirmed on Guam, Tinian and Saipan, but not on Rota.[2]

REFERENCES

1. Center for Plant Conservation. 2010. CPC National Collection Plant Profile: *Heritera longipetiolata*. http://www.centerforplantconservation.org/asp/CPC_ViewProfile.asp?CPCNum=2219.

2. Wiles, G.1998. *Heritera longipetiolata*. *In* IUCN Red List of Threatened Species. Version 2013.2. www.iucnredlist.org. Accessed December 5, 2013.

3. USFWS. 1990. Endangered and Threatened Wildlife and Plants; Review of Plant Taxa for Listing as Endangered or Threatened Species; Notice of Review. Federal Register 55:6184-6229.

4. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

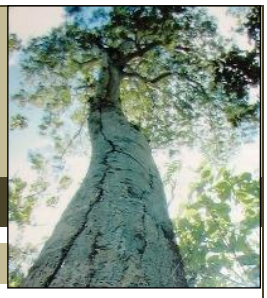
5. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: Waimea.

Common Name: Fire tree

Chamorro Name: Hayun lagu (Guam)

Scientific Name: *Serianthes nelsonii*



SPECIES DESCRIPTION

One of the largest native trees in the Marianas, with reported heights of 118 ft (36 m) and trunk diameters of 6.6 ft (2 m). One or more large roots are exposed above ground, and roots possess nitrogen-fixing nodules. Bark is smooth and light brown in color. Rust-colored "hairs" cover the flowers, seed pods, and newer vegetative growth. Flowers are brush-like and pinkish in color.[1]

LISTING STATUS

Listed as endangered under the federal ESA and Guam ESA.[3, 4] On Guam, also considered a Species of Greatest Conservation Need.[5]

THREATS

The most serious threats are insect predation on seeds, seedling mortality caused by introduced mealybugs, and overgrazing by introduced ungulates (e.g. Philippine deer).[1, 2]

ECOLOGY

Habitat is primarily mature limestone forests near steep hillsides or cliffs. New leaves are produced year-round, but production is lower during the dry season. Flowers and flower buds may be present during all months. Epiphytic ferns and other plants are known to grow in the crowns. Little is known about the life history or ecology.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically and currently on Rota and Guam. Only one mature tree and two introduced saplings on Guam (AAFB), with 60-80 trees on Rota.[3]

REFERENCES

1. USFWS. 1994. Recovery Plan for *Serianthes nelsonii*. Portland, OR.
2. Wiles, G.1998. *Serianthes nelsonii*. *In* IUCN Red List of Threatened Species. Version 2013.2. www.iucnredlist.org. Accessed December 5, 2013.
3. USFWS. 2012. *Serianthes nelsonii* (Hayun lagu) 5-Year Review Summary and Evaluation. Pacific Islands Fish and Wildlife Office, Honolulu, HI. August 28.
4. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.
5. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: http://www.uog.edu/herbarium/dynamicdata/Online%20exhibit.asp.

Common Name:

Chamorro Name:

Scientific Name: *Tabernaemontana rotensis*

SPECIES DESCRIPTION

A medium sized tree growing up to 30 ft (9 m) tall. Flowers are white and mature fruits are bright orange-red colored.[1, 2]

LISTING STATUS

Considered a Species of Greatest Conservation Need by GDAWR.[3] The USFWS proposed listing *Tabernaemontana rotensis* as endangered under the federal ESA in June 2000. In 2004, the USFWS published the decision to refrain from listing the Mariana Island *Tabernaemontana* taxa on the basis of a 1991 taxonomic classification that lumped *T. rotensis* and many other recognized *Tabernaemontana* species into a single widespread species *Tabernaemontana pandacaqui*. The USFWS now recognizes the Guam and Rota *Tabernaemontana* populations to be a local form of *T. pandacaqui*.[4]

THREATS

The most serious threats are habitat destruction or alteration.[1]

ECOLOGY

Habitat is primarily raised limestone terraces. Little is known about the life history or ecology.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically and currently on Rota and Guam.[1, 2, 4]

REFERENCES

1. University of Guam. 2007. Survey of *Tabernaemontana rotensis* on Andersen Air Force Base. Prepared for AAFB. February.

2. Tuquero, J. 2005. Forestry Native Plants of Guam Series: *Tabernaemontana rotensis*. http://www.guamforestry.org/docs/publications/tabernae_FINAL.pdf.

3. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

4. USFWS. 2004. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status and Prudency Determination for Designation of Critical Habitat for Two Plant Species from the Commonwealth of the Northern Mariana Islands; Final Rule. Federal Register 68:18499-18507.

Photo: http://www.guamforestry.org/docs/publications/tabernae_FINAL.pdf.

Common Name: Brown treesnake

Chamorro Name: Culepla

Scientific Name: *Boiga irregularis*

SPECIES DESCRIPTION

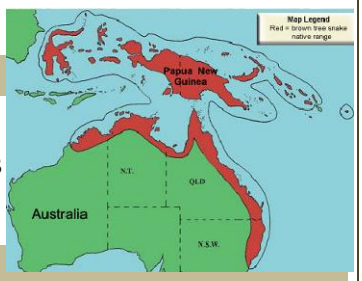
A seemingly harmless snake typically ranging in length from 3-6 ft (0.9-1.8 m). On Guam, such an abundance of prey items are available that individuals are known to grow to lengths of 10 ft (3.0 m). Body type is long and slender, and body color ranges from patterned brown to yellow-green to beige with red markings. On Guam, the coloration is typically brown/olive green with markings. This species does have relatively weak venom, but only the last two teeth are used to inject it, making it rather difficult to use. The venom poses a risk for small children.[1]

ECOLOGY

Preferred habitat is cool, shaded areas during the day for resting. Most feeding and other activities take place at night. Diet includes a large variety of prey organisms, such as small mammals, birds, bird eggs, and other reptiles. On Guam, these snakes are voracious eaters and have been discovered rummaging through garbage. They have also created a major threat to the existence of many native species on Guam, limiting the number of small mammals and the Mariana fruit bat and the extirpation of numerous native birds. Reproduction is not well documented, but females are thought to produce two clutches of eggs each year.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically in the South Pacific, including coastal Australia, Papua New Guinea, and numerous islands in northwestern Melanesia. This species was unintentionally introduced to Guam in the 1950s.[1]



REFERENCES

1. Fritts, T.H. and D. Leasman-Tanner. 2008. The Brown Treesnake on Guam – How the arrival of one invasive species damaged the ecology, commerce, electrical systems, and human health on Guam: A comprehensive information source. http://www.fort.usgs.gov/Resources/Education/BTS/. Last updated May 23, 2008, accessed December 1, 2013.

Map: http://www.fort.usgs.gov/resources/education/bts/bioeco/btsnake.asp#.

Common Name: Pacific slender-toed gecko

Chamorro Name: Guali'ek

Scientific Name: *Nactus pelagicus*

SPECIES DESCRIPTION

One of the most distinctly colored geckos in the region, with alternating dark and light markings. The tail is narrow and rounded with small bumps along the surface. Length averages 2.2 in (57 mm).[1] This species lacks widened digital pads on the hands and feet, unlike other geckos in the region. No males have been identified.[2]

LISTING STATUS

Listed as endangered under the Guam ESA.[3] This species is abundant throughout its global range and is considered a species of Least Concern by the IUCN.[4]

THREATS

The major threat is predation by the brown treesnake and the musk shrew (*Suncus murinus*).[2]

ECOLOGY

Preferred habitat is thought to be rough rock substrates for foraging, and areas with crevices and hiding places during the day for a resting period. Cryptic coloration allows for blending into the environment. This species is particularly prone to hiding or running from man or other animals it sees as a threat. This is an all-female species.[2]

HISTORICAL AND CURRENT DISTRIBUTION

Found historically on Guam, Rota, and Tinian. This species is rare on Guam in recent years, but was common prior to 1945. Thought to possibly occur on other islands, but to go undetected due to its tendency to hide during the day.[2]

REFERENCES

1. Reptilesdownunder.com. 2009. Pelagic gecko (*Gehyra oceanic*). http://www.reptilesdownunder.com/arod/reptilia/Squamata/Gekkonidae/Nactus/pelagicus.

2. USGS. 2009. Extinctions and loss of species from Guam. http://www.fort.usgs.gov/resources/education/bts/impacts/herps.asp.

3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

4. Zug, G., A. Allison, A. Hamilton, and O. Tallowin. 2013. *Nactus pelagicus*. *In* IUCN Red List of Threatened Species. Version 2013.2. www.iucnredlist.org. Accessed December 5, 2013.

Photo: http://www.fort.usgs.gov/resources/education/bts/impacts/herps.asp.

Common Name: Moth skink

Chamorro Name: Guali'ek halom tano'

Scientific Name: *Lipinia noctua*

SPECIES DESCRIPTION

A small skink with a yellow dot on the top of the head which extends down the length of the body as a stripe. Body length is typically 2.2 in (55 mm).[1] The main coloration may be brown or tan with flecks of other colors. The belly color ranges from yellow to orange under the body and legs, and a pale blue-green under the tail and head. This species will break off its toes and/or tail when threatened by a predator.[2]

LISTING STATUS

Listed as endangered under the Guam ESA.[3] On Guam, also considered a Species of Greatest Conservation Need.[6]

THREATS

The major threats are habitat loss, competition with non-native skinks, and predation by non-native species, particulary the brown treesnake.[1, 4]

ECOLOGY

Preferred habitats appear to be on the ground or in low trees, using tree trunks for shelter. Known to hide from predators and become active at night. This species gives birth to live young.[2]

HISTORICAL AND CURRENT DISTRIBUTION

Known to occur in most of the western Pacific, but in the Marianas is only found on Guam. There have been only a few observations of this species on Guam over the past 5 years.[1, 4, 5]

REFERENCES

1. Vogt, S.R. and L.L. Williams. 2004. Common flora and fauna of the Mariana Islands. Published by Laura L. Williams and Scott R. Vogt. Saipan, CNMI.
2. USGS. 2009. Extinctions and loss of species from Guam. http://www.fort.usgs.gov/resources/education/bts/impacts/herps.asp
3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.
4. NAVFAC Pacific. 2010. Natural Resource Survey Report in Support of the Environmental Impact Statement for the Marine Corps Relocation Initiative to Various Locations on Guam, Final. Pearl Harbor, HI.
5. NAVFAC Pacific. 2013. Biological Surveys – Report 2, Various Locations on Guam in Support of the Guam and Commonwealth of the Northern Mariana Islands Military Relocation (2012 Roadmap Adjustments) Supplemental Environmental Impact Statement. Prepared for Joint Guam Program Office, Washington, DC by TEC-AECOM Pacific Joint Venture, Honolulu, HI. April.
6. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: http://www.fort.usgs.gov/resources/education/bts/impacts/herps.asp.

Common Name: Green sea turtle

Chamorro Name: Haggan betde

Scientific Name: *Chelonia mydas*

SPECIES DESCRIPTION

The largest of all the hard-shelled sea turtles at over 3 ft (0.9 m) in length and 300 lbs (136 kg). Their name stems from green-colored fat, which reportedly occurs from their primarily herbivorous diet. The carapace ranges from shades of black, grey, green, brown and yellow, while their ventral surface (plastron) is yellowish-white.[1]

LISTING STATUS

Listed as threatened under the federal ESA and Guam ESA.[1, 3]

THREATS

The major threats are alteration or loss of nesting habitat, decreased quality of sensitive marine habitats such as seagrass, vessel strikes, hunting for commercial or subsistence use, take of eggs, incidental take in fisheries, and diseases such as fibropapillomatosis, which results in internal and/or external tumors.[2]

ECOLOGY

Preferred habitat varies by life stage, and highly mobile. All young are born on the beach, and females return to land to nest. Adults primarily occur in coastal waters, but do make long migrations over deep waters to transit to and from foraging, nesting and mating areas. Limited nesting activity has been confirmed on the beaches of Guam from January-March. Adults feed primarily on seagrass and a variety of algae, although some have been documented eating invertebrates. Juveniles are thought to remain in convergence zones for many years, feeding on pelagic prey items such as floating mats of algae (e.g. *Sargassum*) or ctenophores.[2]

HISTORICAL AND CURRENT DISTRIBUTION

Occurs in most oceans, including the western, central and eastern Atlantic, Mediterranean Sea, western, northern and eastern Indian, southeast Asia, and the western, central and eastern Pacific. In the Pacific, occurs around most of the islands, including the Hawaiian Island chain, American Samoa, Guam, and CNMI. The most abundant nesting sea turtle species on Guam and within Guam waters.[2]

REFERENCES

1. NMFS. 2013. Green Turtle (*Chelonia mydas*). http://www.nmfs.noaa.gov/pr/species/turtles/green.htm. Last updated June 21, accessed December 5.

2. NMFS and USFWS. 2007. Green Sea Turtle (*Chelonia mydas*), 5-Year Review Summary and Evaluation. August.

3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

Photo: http://www.nmfs.noaa.gov/pr/species/turtles/green_photos.htm.

Common Name: Hawksbill sea turtle

Chamorro Name: Haggan karai

Scientific Name: *Eretomochelys imbricata*

SPECIES DESCRIPTION

A smaller sea turtle, measuring less than 3 ft (0.9 m) in length and 150 lbs (68 kg). Their name stems from the shape of the head, which is elongated and narrows to a point. Carapace has tortoiseshell coloring, ranging from dark to gold-brown with streaks of colors including orange, red and black, while their ventral surface (plastron) is a clear yellow color.[1]

LISTING STATUS

Listed as endangered under the federal ESA and Guam ESA.[2, 3]

THREATS

The major threats are alteration or loss of nesting habitat, decreased quality of sensitive marine habitats such as seagrass, vessel strikes, hunting for commercial or subsistence use, take of eggs, incidental take in fisheries, and diseases such as fibropapillomatosis, which results in internal and/or external tumors.[2]

ECOLOGY

Preferred habitat is varies by life stage, and this species is highly mobile. All young are born on the beach, and only females return to land to nest. Adults are found in coastal and offshore waters, and are known to make long migrations over deep waters to transit to and from foraging, nesting and mating areas. Limited nesting activity has been confirmed on the beaches of Guam from January-March. Adults forage on the seafloor on corals and other invertebrates. Adults are known to frequent ledges and caves of coral reefs, and to return to the same areas nightly to rest. Juveniles are thought to feed on the surface, but in the Pacific little is known about the juvenile phase.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Occur circumtropically, from 30°N to 30°S in the Atlantic, Pacific, and Indian Oceans and associated water bodies, including the Caribbean Sea and Gulf of Mexico. In the Pacific, occurs around most of the islands, including the Hawaiian Islands, American Samoa, Guam, and CNMI. Although rare, individuals have been documented nesting on Guam.[1]

REFERENCES

1. NMFS. 2013. Hawksbill Turtle (*Eretmochelys imbricate*). http://www.nmfs.noaa.gov/pr/species/turtles/hawksbill.htm. Last updated November 22, accessed December 5.

2. NMFS and USFWS. 2013. Hawksbill sea turtle (*Eretmochelys imbricata*), 5-Year Review Summary and Evaluation. June.

3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

Photo: http://www.nmfs.noaa.gov/pr/species/turtles/hawksbill_photos.htm.

Common Name: Guam rail

Chamorro Name: Ko'ko'

Scientific Name: *Rallus owstonii*

SPECIES DESCRIPTION

A flightless bird with no external sexual dimorphism. Coloration is grey on the upper breast, lower neck and eyebrow, and brown on the head, neck, eye stripe, iris, legs and feet. The stomach is distinctly white-striped. Although outward appearance is indistinguishable between sexes, males weigh on average more than females.[1]

LISTING STATUS

Listed as endangered under the federal ESA and Guam ESA.[2, 3] On Guam, also considered a Species of Greatest Conservation Need.[5]

THREATS

The major threats are predation by non-native species such as dogs, cats, rats, a monitor lizard, and the brown treesnake, past hunting efforts, and impacts of typhoons to populations with such low numbers.[1, 4]

ECOLOGY

Preferred habitats are numerous, and include all habitats located on Guam except for wetlands. Diet is omnivorous, consisting of snails, skinks, geckos, insects, seeds, and palm leaves. Nesting occurs year-round, with males and females sharing in the nesting duties. Young leave the nest to learn to forage within 24 hours of hatching.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Endemic to Guam, and was once found throughout the island. The Guam rail has been extirpated in the wild on Guam since 1985 and exists primarily in captivity on Guam and in mainland zoos. Guam rails were introduced onto Rota, CNMI in 1989 and onto Cocos Island, off the southern coast of Guam, in 2011.[1, 4]

REFERENCES

1. USFWS. 2012. Endangered Species in the Pacific Islands: Guam Rail/*Gallirallus owstoni*/Ko'ko'. http://www.fws.gov/pacificislands/fauna/guamrail.html.

2. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

3. USFWS. 2011. Guam and Commonwealth of the Northern Mariana Islands Animals & Plants – Listed Species. Updated February 2, 2011. Listed Species, as Designated under the U.S. Endangered Species Act. http://www.fws.gov/pacificislands/species.html. Accessed May 30, 2013.

5. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

4. *Photo*: Smithsonian National Zoo.

Common Name: Mariana common moorhen

Chamorro Name: Pulattat

Scientific Name: *Gallinula chloropus guami*

SPECIES DESCRIPTION

A member of the rail family, although slightly resembles a duck. Coloration is primarily slate black, with white undertail coverts and a white line along the flank. Legs are long and olive green or yellow colored. The most distinguishing feature is a red frontal "shield" on the bill. Toes are lobed, making it possible for walking across plants that are floating on top of the water. Females closely resemble males, but have a smaller frontal shield. Overall body length is typically 14 in (350 mm).[1, 2]

LISTING STATUS

Listed as endangered under the federal ESA and Guam ESA.[3, 4] On Guam, also considered a Species of Greatest Conservation Need.[5]

THREATS

The most serious threat is habitat loss, particularly loss of wetlands. Other threats include encroachment of non-native vegetation and human disturbance.[1, 2]

ECOLOGY

Preferred habitats include natural and manmade wetlands, including freshwater lakes, marshes and swamps, and some brackish areas such as tidal channels or mangrove wetlands. Diet is omnivorous, consisting of such items as grass, insects, and insect larvae. Nesting occurs year-round, and nests are created on or near standing water. Young leave the nest to learn to forage soon after hatching.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Historic distribution was Guam, Saipan, Tinian and Pagan. Currently found on Guam, Saipan, and Tinian; extirpated from Pagan.[1]

REFERENCES

1. USFWS. 1991. Recovery Plan – Mariana Common Moorhen *Gallinula chloropus guami*. Region One, Portland, OR. September.
2. USFWS. 2012. Endangered Species in the Pacific Islands: Mariana Common Moorhen/*Gallinula chloropus guami*/Pulattat. http://www.fws.gov/pacificislands/fauna/marianamoorhen.html. Last updated September 20, 2012, accessed June 15, 2013.
3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.
4. USFWS. 2011. Guam and Commonwealth of the Northern Mariana Islands Animals & Plants – Listed Species. Updated February 2, 2011. Listed Species, as Designated under the U.S. Endangered Species Act. http://www.fws.gov/pacificislands/species.html. Accessed May 30, 2013.
5. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: S. Vogt.

Common Name: Mariana crow

Chamorro Name: Aga

Scientific Name: *Corvus kubaryi*

SPECIES DESCRIPTION

Known as a small crow. Coloration is various shades of black, from greenish black on the head to bluish black on the wings and tail. The bases of the feathers are light grey to white, which can give a "ragged" appearance. Females and males are difficult to distinguish, but females are smaller.[1]

LISTING STATUS

Listed as endangered under the federal ESA and Guam ESA.[2, 3] Critical habitat has been designated under the federal ESA on Guam and Rota.[2] In Guam, also considered a Species of Greatest Conservation Need.[4]

THREATS

The most serious threats include predation by non-native organisms such as the brown treesnake, cats, rats and a monitor lizard. Preventative efforts have included "snake-proofing" trees where nests are located. Other threats include habitat destruction and human disturbances.[1, 2]

ECOLOGY

Preferred habitats include forested areas such as limestone, strand, ravine, and secondary forests, although limestone forests seem to be the most preferred habitat type. Diet is omnivorous, consisting of a large variety of plants and animals such as grasshoppers, skinks, and a variety of foliage and fruits. Foraging occurs primarily in native trees. Nesting is thought to occur year-round, and nests are created over a week-long period in native trees.[1, 2]

HISTORICAL AND CURRENT DISTRIBUTION

Historic distribution was on Guam and Rota, where populations were once large. As of 2012, the Mariana crow is considered extirpated in the wild on Guam (Personal communication via Letter from USFWS, Pacific Islands Fish and Wildlife Office, Honolulu, HI regarding DON NOI for Proposed Placement of LFTRC on Guam NWR; December 7, 2012). Rota still supports a small population of Mariana crows.[2]

REFERENCES

1. USFWS. 2005. Draft Revised Recovery Plan for the Mariana crow (*Corvus kubaryi*). May.

2. USFWS. 2012. Endangered Species in the Pacific Islands: Mariana Crow/*Corvus kubaryi*/Aga. http://www.fws.gov/pacificislands/fauna/marianacrow.html. Last updated September 20, 2012, accessed June 15, 2013.

3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

4. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: C. Kessler.

Common Name: Guam Micronesian kingfisher

Chamorro Name: Sihek

Scientific Name: *Todiramphus cinnamomina cinnamomina*

SPECIES DESCRIPTION

Known as a small to medium-sized kingfisher. Coloration varies by sex, with males exhibiting a cinnamon-brown head, neck and upper parts, a black line that extends around the nape, a greenish-blue lower back, shoulder, and underwings, and a blue tail. Females are very similar to males, with the major differences being a paler upper chest, chin and throat, and underparts and underwing linings white instead of cinnamon-brown. Body length is approximately 8 in (200 mm) and weight is on the order of 1.8-2.7 oz (50-76 g).[1]

LISTING STATUS

Listed as endangered under the federal ESA and Guam ESA.[1, 2] Critical habitat has been designated under the federal ESA on Guam.[1] In Guam, also considered a Species of Greatest Conservation Need.[2]

THREATS

Primary threats are habitat destruction and modification, predation by non-native species such as cats, rats a monitor lizard and brown tree snakes, and limited population growth in the captive-bred population.[1]

ECOLOGY

Preferred habitats include a wide variety of forested areas such as limestone, strand, ravine, agricultural and secondary forests, edge habitats, and forest openings. Diet is carnivorous, consisting of a large variety of animals such as skinks, insects, and hermit crabs. Foraging occurs primarily in native trees. Nesting takes place in cavities created in standing dead trees.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Historic distribution was on Guam only. Populations were once large, but the species has been extirpated from the wild since 1988. It is now found only in captivity on Guam and at mainland zoos.[1]

REFERENCES

1. USFWS. 2008. Revised Recovery Plan for the Sihek or Guam Micronesian kingfisher (*Halcyon cinnamonina cinnamonina*). October.

2. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

Photo: K. Ilio.

Common Name: Mariana swiftlet

Chamorro Name: Yayaguak

Scientific Name: *Aerodramus vanikorensis bartschi*

SPECIES DESCRIPTION

A small bird with primarily dark grey-brown body color. Plumage is paler on the ventral surface. A dark line crosses through the eye, and the tail is squared off. Males and females are similar in external appearance.[1]

LISTING STATUS

Listed as endangered under the federal ESA and Guam ESA.[1, 2] In Guam, also considered a Species of Greatest Conservation Need.[3]

THREATS

Most serious threats include modification or destruction of habitat and disturbance of caves from guano mining or other human interference. Predation by non-native species may have also played a role in this species' decline.[1]

ECOLOGY

Preferred habitat is in limestone caves with entrances measuring approximately 6.6 ft (2 m) high. Known to nest and roost inside these caves, and to leave the caves to eat and drink. Foraging occurs over many habitat types, although preferred foraging habitat appears to be ridge crests and open grassy areas. Diet includes various insects. This species uses echolocation for navigation.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Historically found on the Mariana Islands of Guam, Rota, Aguiguan, Tinian, and Saipan. This species currently occurs on Guam, Aguiguan, and Saipan, but is considered extirpated from Tinian and Rota. There are only three known nesting/roosting caves on Guam for this species and they are located in the northern NAVMAG.[1, 4]

REFERENCES

1. USFWS. 1991. Recovery plan for the Mariana Islands population of Vanikoro swiftlet (*Aerodramus vanikorensis bartschi*). Portland, OR. September.

2. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

3. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

4. USFWS. 2010. Mariana Swiftlet or Chachaguak (*Aerodromus bartschi*) 5-Year Review Summary and Evaluation. Pacific Islands Fish and Wildlife Office, Honolulu, HI. August 27.

Photo: http://www.mesc.usgs.gov/resources/education/bts/impacts/birds.asp

Common Name: Micronesian starling

Chamorro Name: Sali

Scientific Name: *Aplonis opaca guami*

SPECIES DESCRIPTION

A small bird with primarily glossy black body color in adults. Tail is short and they eye is distinctly yellow. Body length is approximately 9 in (230 mm).[1, 2]

LISTING STATUS

Listed as endangered under the Guam ESA and also considered a Species of Greatest Conservation Need.[3, 4]

THREATS

Most serious threats include modification or destruction of habitat and predation by the brown treesnake and other non-native species.[1]

ECOLOGY

Known to use all habitat types, although most common in forested areas. Foraging occurs over many habitat types, but preferred foraging habitat appears to be ridge crests and open grassy areas. Diet is omnivorous and includes various insects, seeds and fruits. Known as a cavity nester, and both parents incubate the eggs. Cavity nesting may be the main reason this species has not been extirpated like other bird species in the region.[1, 2]

HISTORICAL AND CURRENT DISTRIBUTION

Historically and currently found on Guam, Tinian, and Saipan. This species presently occurs on Guam at AAFB, Cocos Island, parts of Hagåtña, and southeastern beach strand areas.[2, 5]

REFERENCES

1. Grimm, G.R. 2010. Micronesian Starling. http://guampedia.com/micronesian-starling/. Last updated August 12, 2010, accessed December 5, 2013.

2. GDAWR. 1994. Sali (Micronesian Starling) *Aplonis opacus guami*. Department of Agriculture, Guam.

3. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

4. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

5. JRM. 2013. Final Joint Region Marianas Integrated Natural Resources Management Plan. Prepared for Commander Joint Region Marianas, Guam by HDR, Hagåtña, Guam. June.

Photo: http://www.mesc.usgs.gov/resources/education/bts/impacts/birds.asp.

Common Name: Mariana fruit bat

Chamorro Name: Fanihi

Scientific Name: *Pteropus mariannus mariannus*

SPECIES DESCRIPTION

A medium sized fruit bat, with body weight in the range of 0.9-1.2 lbs (408-544 g). Body color is black or brown on the ventral surface with some grey hair, and the neck is bright golden brown. The head is brown or dark brown. Males are slightly larger than females.[1]

LISTING STATUS

Listed as threatened under the federal ESA and Guam ESA. Critical habitat has been designated under the federal ESA on Guam.[1, 2] In Guam, also considered a Species of Greatest Conservation Need.[3]

THREATS

Most serious threats include poaching, modification or disturbance of habitat, predation by the brown treesnake on juveniles, and the use of pesticides and fertilizers.[1]

ECOLOGY

Known to use native forest habitat types including native limestone, and also are known to frequent coconut groves. Highly colonial, colonies of several to over 800 individuals exist. The typical social behavior is grouping into harems, with one male grouping with 2-15 females, although some males remain "bachelors".[1] Diet includes foraging for various fruits, flowers and other plant materials. Reproduction appears to occur year-round, and breeding typically occurs after 18 months of age.[1]

HISTORICAL AND CURRENT DISTRIBUTION

Historically and currently found throughout the CNMI and Guam.[1]

REFERENCES

1. USFWS. 2009. Draft Revised Recovery Plan for the Mariana Fruit Bat or Fanihi (*Pteropus mariannus mariannus*). Portland, OR.

2. GovGuam. 2009. Endangered Species Regulation No. 9. Department of Agriculture, Mangilau, Guam. November 6.

3. GDAWR. 2006. Guam Comprehensive Wildlife Conservation Strategy (GCWCS). Department of Agriculture, Guam. 7 November.

Photo: USFWS.

DEPARTMENT OF THE NAVY
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Field Supervisor, Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
Department of the Interior
300 Ala Moana Boulevard Room 3-122 Box 50088
Honolulu, Hawaii 96850

APR 3 2013

Dear Dr. Mehrhoff,

As requested by your office on October 12, 2012, the Department of the Navy (DON) is re-initiating consultation on the "Biological Opinion (BO) for the Joint Guam Program Office Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam and Tinian" (2010-F-0122). The enclosed Biological Assessment (BA) analyzes the potential impacts on Federally- listed threatened and endangered species and designated critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service from DON actions addressed in the Final Environmental Impact Statement which remain final under the September 2010 Record of Decision (ROD) and either are under construction or could begin construction prior to 2015.

On April 27, 2012, the U.S.-Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust Marine Corps realignment plans outlined in the May 2006 Realignment Roadmap. In accordance with the SCC's adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially smaller force on Guam. Specifically, the adjustments include reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents on Guam. That decision prompted the DON's review of the major actions previously planned for Guam and approved in the ROD and addressed in the BO. This review concluded that while some actions remain unchanged as a result of the smaller force size, others, such as the main cantonment and family housing areas, could significantly change as a result of the modified force. The DON has opted to address these significant changes in a Supplemental Environmental Impact Statement (SEIS) (77 FR 61746, October 11, 2012). As part of the SEIS process, DON anticipates we will need to consult with your office under Section 7 of the Endangered Species Act (ESA).

The actions addressed in the enclosed BA include only those actions which remain final under the 2010 ROD and are either under construction or could begin construction prior to completion of SEIS process and issuance of a new ROD (expected in 2015). As required by Section 7 of the ESA, the DON has considered potential impacts of these

actions on Federally- listed species and designated critical habitat in the drafting of the BA. Based on our analysis, the DON has determined the only species potentially affected by the construction and operation of the interim activities is the Federally-listed Mariana fruit bat. The DON expects the effects to be discountable or insignificant; therefore, the DON requests concurrence from your office that the actions described in the enclosed BA are "not likely to adversely affect" the Mariana fruit bat.

We look forward to your response. If you have any questions regarding this request for re-initiation, please do not hesitate to let me know. My staff point of contact is Mr. J. Dan Cecchini, JGPO Environmental Director, at (703) 602-4725 or e-mail at joseph.cecchini@navy.mil.

Sincerely,

Joseph Ludovici
Director, Joint Guam Program Office

Enclosures: (1) Biological Assessment for the Re-Initiation of Consultation from the Proposed Military Relocation to Guam Fiscal Years 2010-2015

Copy To:
DASN(E)
Joint Region Marianas
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NAVFAC Pacific
Marine Forces Pacific DPRI
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CNIC (N45)
Headquarters, Pacific Air Forces
Headquarters, Naval Facilities Engineering Command

Biological Assessment for the Re-Initiation of Consultation from the Proposed Military Relocation to Guam Fiscal Years 2010-2015

Prepared by:

Naval Facilities Engineering Command

Prepared for:

United States Fish and Wildlife Service

200 Ala Moana Blvd, Room 3-122, Box 50088

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2 April 2013

Acronyms and Abbreviations

ac	acre(s)
ACE	Air Combat Element
AFB	Air Force Base
AGL	above ground level
AMC	Air Mobility Campus
APHIS	Animal and Plant Health Inspection Service
BA	Biological Assessment
BMP	Best Management Practice
BO	Biological Opinion
BOWTS	Bilge Oily Waste Treatment System
BTS	brown treesnake(s)
CFR	Code of Federal Regulations
cm	centimeter(s)
CNMI	Commonwealth of the Northern Mariana Islands
COMNAV	Commander Navy Region
CWCS	Comprehensive Wildlife Conservation Strategy
DAWR	Guam Department of Aquatic and Wildlife Resources
DFW	CNMI Division of Fish and Wildlife
DoD	Department of Defense
DON	Department of Navy
EA	Environmental Assessment
ECM	earth covered magazine
EIS	Environmental Impact Statement
ERA	Ecological Reserve Area
ESA	Endangered Species Act
ESQD	Explosive Safety Quanitity Distance
FAA	Federal Aviation Administration
FDM	Farallon de Medinilla
ft	foot/feet
ft^2	square foot/feet
g	gram(s)
GovGuam	Government of Guam
HACCP	Hazard Analysis and Critical Control Point
ha	hectare(s)
HQ	Headquarters
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
ISR	Intelligence, Surveillance, and Reconnaissance
JGPO	Joint Guam Program Office
km	kilometer(s)
km^2	square kilometer(s)
hlb	pound(s)
LCAC	Landing Craft Air Cushion
LFTRC	Live-Fire Training Range Complex
LEED	Leadership in Energy and Environmental Design
m	meter(s)
m^2	square meter(s)
mm	millimeter(s)
MAW	Marine Air Wing
MBP	Micronesia Biosecurity Plan
MCO	Marine Corps Order
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
mi	mile(s)
mi^2	square mile(s)
min	minute(s)
MIRC	Mariana Islands Range Complex
MLLW	mean lower low water
MOA	Memorandum of Agreement
MSA	Munitions Storage Area
MWDK	Military Working Dog Kennel
NAVFAC	Naval Facilities Engineering Command
NCTS	Naval Computer and Telecommunication Site
NEPA	National Environmental Policy Act
NISC	National Invasive Species Council
NMFS	National Marine Fisheries Service
NMS	Naval Munitions Site
NR	Natural Resources
NWR	National Wildlife Refuge
OEIS	Overseas Environmental Impact Statement
OPNAVINST	Chief of Naval Operations Instruction
oz	ounce(s)
POV	personal-owned vehicle
SDZ	Surface Danger Zone
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
yd	yard(s)

EXECUTIVE SUMMARY

On September 8, 2010, the U.S. Fish and Wildlife Service (USFWS) issued its Biological Opinion (BO) (2010-F-0122) for the relocation of certain elements of the United States (U.S.) Marine Corps from Okinawa to Guam (as outlined in the May 2006 Realignment Roadmap). The Biological Opinion addressed the preferred alternative in the Final Environmental Impact Statement (FEIS) for the ‘‘Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force,’’ dated July 2010. A Record of Decision (ROD) for the FEIS was signed on September 20, 2010 (75 FR 60438, September 30, 2010). The ROD deferred a decision on a specific location for a live-fire training range complex.

In the months following the issuance of the ROD, Department of the Navy (DON) made adjustments with regards to the live-fire training range complex (LFTRC), including application of probabilistic modeling that reduced the overall footprint of the Multi-Purpose Machine Gun range. The DON initially elected to prepare a Supplemental EIS limited solely to the evaluation of impacts associated with the location, construction, and operation of the live fire training range complex (77 FR 6787, February 9, 2012). The scoping and comment period for the project began on Feb 9, 2012 and closed on April 6, 2012. On April 27, 2012, the U.S.-Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap. In accordance with the SCC’s adjustments, the DoD adopted a new force posture in the Pacific providing for a materially smaller force on Guam. Specifically, the adjustments include reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents on Guam. That decision prompted the DON’s review of the major actions previously planned for Guam and approved in the September 2010 ROD and addressed in the September 2010 BO. This review concluded that while some actions remain unchanged as a result of the smaller force size, others, such as the main cantonment and family housing areas, could significantly change as a result of the modified force. The DON has opted to address these changes in a SEIS (77 FR 61746, October 11, 2012).

The proposed reduction in the size of the new force structure does not affect all of the decisions that were made in the September 2010 ROD. For example, the relocation of the Marine Corps Aviation Combat Element facilities to Andersen Air Force Base (AAFB), the development of the North Gate and access road at AAFB, Apra Harbor wharf improvements, and the non-live-fire training ranges on Andersen South remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments. These actions will occur no matter where on Guam the main cantonment and family housing areas and live-fire training range complex are situated. The potential environmental effects of these actions were fully and accurately considered and analyzed in the 2010 Final EIS. For those decisions that are not affected by the new force structure, the September 2010 ROD stands as the final agency action for those elements.

At the request of the U.S. Fish and Wildlife Service, DON has prepared this Biological Assessment to analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS from DON actions addressed in the FEIS that are not affected by the April 2012 SCC joint statement and will begin construction prior to 2015. Based on the evaluation presented in this BA, the only species potentially affected by the DON construction activities taking place prior to 2015 is the federally listed threatened Mariana fruit bat. The effects are expected to be discountable or insignificant, and, therefore, the DON believes a "may affect, is not likely to adversely affect" determination is the appropriate assessment of the effect.

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BIOLOGICAL ASSESSMENT FOR THE RE-INITIATION OF CONSULTATION FOR THE PROPOSED MILITARY RELOCATION TO GUAM FISCAL YEARS 2010-2015

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CHAPTER 1
INTRODUCTION

On September 8, 2010, a U.S. Fish and Wildlife Service (USFWS) issued its Biological Opinion (BO) (2010-F-0122) for the Joint Guam Program Office Relocation of the U.S. Marine Corps from Okinawa to Guam (as outlined in the May 2006 Realignment Roadmap). The Biological Opinion addressed the preferred alternative in the Final Environmental Impact Statement (FEIS) for the ''Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force,'' dated July 2010. A Record of Decision (ROD) for the FEIS was signed on September 20, 2010 (75 FR 60438, September 30, 2010). The ROD deferred a decision on a specific location for a live-fire training range complex.

In the months following the issuance of the ROD, the Department of the Navy (DON) made adjustments with regards to the live-fire training range complex, including application of probabilistic method that reduced the overall footprint of the Multi-Purpose Machine Gun range. The DON initially elected to prepare a Supplemental EIS limited solely to the evaluation of impacts associated with the location, construction, and operation of the live fire training range complex (77 FR 6787, February 9, 2012). The scoping and comment period for the project began on Feb 9, 2012 and closed on April 6, 2012. On April 27, 2012, the U.S.-Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap. In accordance with the SCC's adjustments, the DoD adopted a new force posture in the Pacific providing for a materially smaller force on Guam. Specifically, the adjustments include reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents on Guam. That decision prompted the DON's review of the major actions previously planned for Guam and approved in the September 2010 ROD and addressed in the September 2010 BO. This review concluded that while some actions remain unchanged as a result of the smaller force size, others, such as the main cantonment and family housing areas, could significantly change as a result of the modified force. The DON has opted to address these changes in a SEIS (77 FR 61746, October 11, 2012).

As discussed above, the proposed reduction in the size of the new force structure does not affect all of the decisions that were made in the September 2010 ROD. The relocation of the Marine Corps Aviation Combat Element facilities to AAFB, the development of the North Gate and access road at AAFB, Apra Harbor wharf improvements, and the non-live-fire training ranges on Andersen South remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments. These actions will occur no matter where on Guam the main cantonment and family housing areas and live-fire training range complex are situated. The potential environmental effects of these actions were fully and accurately considered and analyzed in the 2010 Final EIS. For those decisions that are not affected by the new force structure, the September 2010 ROD stands as the final agency action for those elements.

Section 7 regulations outline four general conditions for reinitiating formal consultation: (1) the amount or extent of incidental take is exceeded; (2) 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) the action is modified in a manner causing effects to listed species or critical habitat not previously considered; (4) a new species is listed or critical habitat designated that may be affected by the action. Based on a request by the USFWS, this Biological Assessment (BA) has been prepared to re-analyze potential impacts from projects and actions associated with the realignment that are unaffected by the recently announced force structure change, will not be re-considered in the ongoing SEIS, and either have occurred or will occur by 2015.

1.1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The overarching need for the Proposed Action is to locate U.S. military forces within a timely response range to meet international agreement and treaty requirements and to fulfill U.S. policy to provide mutual defense, deter aggression, and dissuade coercion in the Western Pacific Region.

The Proposed Action described herein addresses those decisions that were made in the September 2010 ROD that (1) remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments and (2) will begin construction prior to 2015.

For a more detailed discussion of the purpose of and need for the Proposed Action, please refer to the FEIS, specifically Chapter 1 in each of the following volumes:

- Volume 1 (Overview of Proposed Action and Alternatives)
- Volume 2 (Marine Corps Relocation – Guam)
- Volume 6 (Related Actions – Utilities and Roadway Projects)

1.2 SPECIES ADDRESSED IN THIS BA

Section 7(a)(2) of the Endangered Species Act states, "Each Federal agency shall, in consultation with and with the assistance of the Secretary of the Interior, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species." To "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. [50 CFR §402.02]

The only threatened or endangered species that "may be present" within the Action Area of the actions covered in the scope of this BA is the federally listed threatened Mariana fruit bat (Table 1-1).

For the purposes of this BA, the Guam 'Action Area' includes several DoD and non-DoD parcels proposed for use: Andersen AFB, Andersen South, Naval Base Guam, Tumon (Maui well rehabilitation), and Piti and Agana (DAR road projects).

1.3 Species Eliminated from Detailed Analysis

As part of the previous consultation, DON consulted on nine (9) species. Eight (8) of those species have been excluded from analysis within this BA because either: (1) the DON has determined that the revised Proposed Action would not affect the species or (2) the species are not present in the Action Area (Table 1-1).

The Mariana swiftlet, Mariana common moorhen, green turtle and hawksbill turtle are listed as threatened or endangered and occur on Guam, however, the DON has determined that the Proposed Action would not affect these species and all are excluded from analysis within this BA. The DON has reached this conclusion because construction activities addressed in this BA are not sufficiently proximate to directly or indirectly affect individuals of the aforementioned species in the terrestrial environment. A separate BA was prepared to address potential impacts to sea turtles in the marine environment under the jurisdiction of the National Marine Fisheries Service (NMFS). A Biological Opinion was rendered by the NMFS on August 25, 2010.

The Guam Micronesian kingfisher, Guam rail, Mariana crow and Micronesian megapode are extirpated from the wild on Guam and therefore are not present in the Action Area. No direct or indirect effect can occur to these species as a result of the Proposed Action because they are not found within the Action Area. As stated above, Section 7(a)(2) of the Endangered Species Act requires federal agencies to consult on actions that may jeopardize the continued existence of any endangered species or threatened species. Since the birds no longer exist in the wild, DON's actions will not reduce the reproduction, numbers, or distribution of the species.

Table 1-1. Distribution of Federally Listed Species within the Action Area

	SPECIES				
CONSTRUCTION PROJECT	Mariana fruit bat	Mariana swiftlet	Mariana common moorhen	Green turtle	Hawksbill turtle
North Ramp Utilities and Site Improvements (J-200)	x				
North Ramp Utilities (P-100)	x				
AAFB North Ramp Parking (P-101 – also includes P-101A)	x				
Aircraft Maintenance Hangar – North Ramp (P-109)	x				
Air Mobility Campus Terminal (P-3202)	x				
Utilities and Site Improvement, Phase I; Aviation Combat Element Gate (J-001)	x				
Utilities and Site Improvements, Phase I: Apra Harbor (J-001)					
Apra Harbor Wharf Improvements (P-204 – also includes P-204A)					
Working Dog Relocation (P-1003)					
Defense Access Roads - Various Locations (P-1006)					
Tumon Maui Well Project					
Non-Live Fire Training Area - Andersen South					
Hazard Analysis and Critical Control Point Planning					
Baseline Monitoring					

x = Species reported in area

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CHAPTER 2
PROPOSED ACTION AND CONSERVATION MEASURES

2.1 PROPOSED ACTION

As stated in Chapter 1, the purpose of this BA is to analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS from those actions which remain final under the 2010 ROD and under construction, or will begin construction prior to 2015. The Proposed Action in this BA includes those decisions that were made in the September 2010 ROD that (1) remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments and (2) are either under construction or will begin construction prior to 2015.

2.2 MILITARY RELOCATION CONSTRUCTION PROJECTS 2010-2015

Implementation of the Proposed Action would include the projects depicted in Figures 2-1 through 2-6 and described in Sections 2.2.1 through 2.2.14.

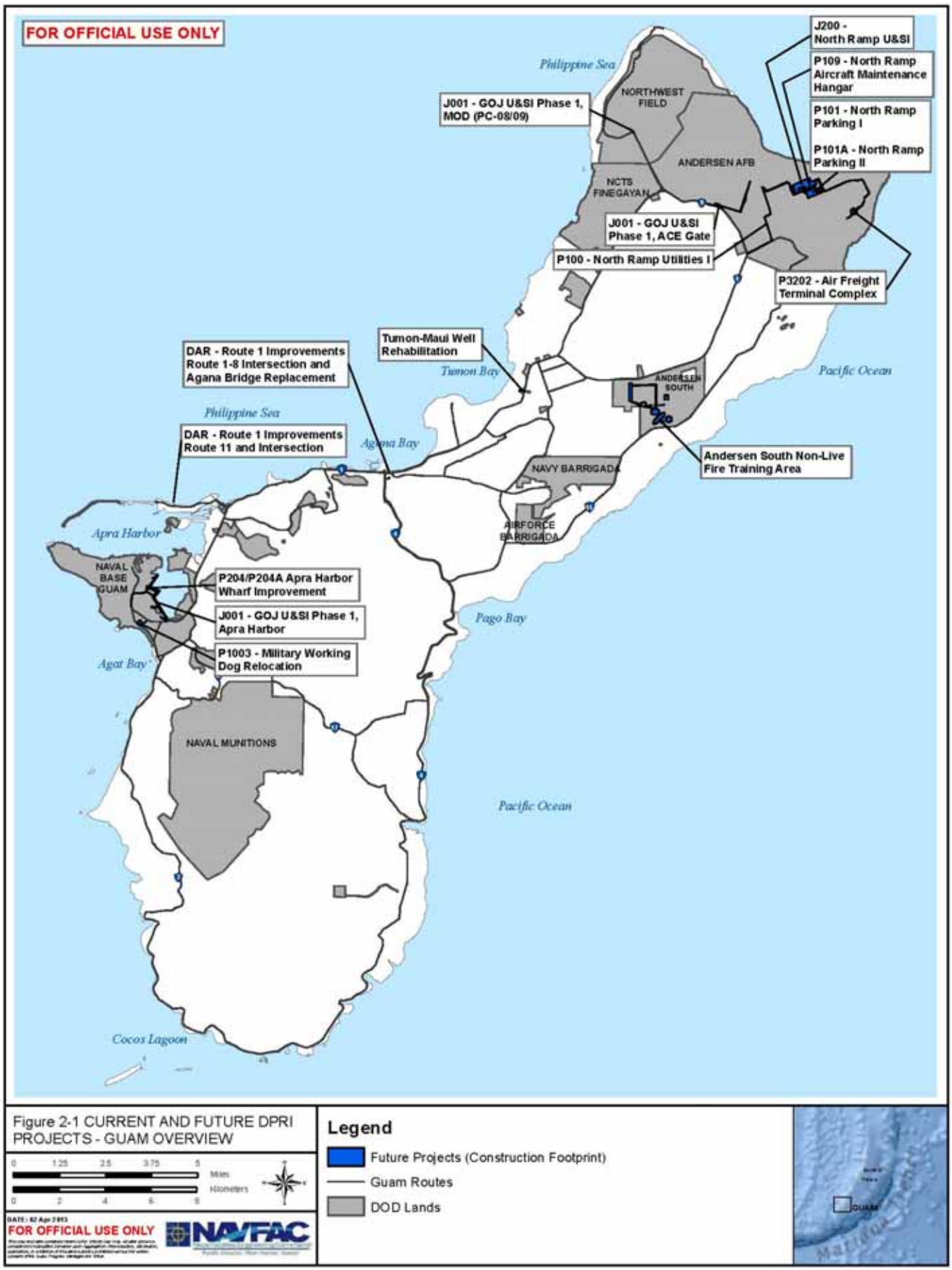
2.2.1 North Ramp Utilities and Site Improvements (J-200)

Proposed Construction

Project constructs a new 20MVA (megavolt ampere) substation at the North Ramp Area, and constructs underground distribution of electrical power through new concrete encased duct banks from the main substation at AAFB to the new North Ramp substation and extending to the new North Ramp parking apron (Figure 2-2). The 13.8kv loop provides power to the fire pump building, sewerage pumping station, and future North Ramp loads. Plumbing facilities are provided for the support spaces in the North Ramp Substation Building. Heating, ventilation, and air conditioning (HVAC) facilities are provided for the North Ramp Substation Building and the Fire Pump Building.

Site preparation will include clearing and grubbing, earthwork (cut and fill), temporary erosion and sediment control, and landscaping. Paving and site improvements will consist of flight line security fencing, access gates, and turnstiles; roadways, driveways, parking areas, and other hardscape, sidewalk and ramps, retaining walls and CMU structures; and the clearance of munitions of concern (MEC) / unexploded ordnance (UXO) removal.

The electrical infrastructure will include networks of primary feeders installed in ducts and manholes, as well as street lighting with associated service equipment. Project constructs a communications duct bank from the AAFB communications plant to the North Ramp area and includes copper cable and fiber optic cable, communications manholes, and pre-cast concrete communication vault.


FOR OFFICIAL USE ONLY
J200 - North Ramp U&SI
P109 - North Ramp Aircraft Maintenance Hangar
P101 - North Ramp Parking I
P101A - North Ramp Parking II
J001 - GOJ U&SI Phase 1, MOD (PC-08/09)
Philippine Sea
NORTHWEST FIELD
ANDERSEN AFB
NCTS FINEGAYAN
J001 - GOJ U&SI Phase 1, ACE Gate
P100 - North Ramp Utilities I
P3202 - Air Freight Terminal Complex
Tumon-Maui Well Rehabilitation
DAR - Route 1 Improvements Route 1-8 Intersection and Agana Bridge Replacement
Tumon Bay
Pacific Ocean
ANDERSEN SOUTH
Philippine Sea
DAR - Route 1 Improvements Route 11 and Intersection
Agana Bay
Andersen South Non-Live Fire Training Area
NAVY BARRIGADA
AIRFORCE BARRIGADA
Apra Harbor
NAVAL BASE GUAM
P204/P204A Apra Harbor Wharf Improvement
J001 - GOJ U&SI Phase 1, Apra Harbor
P1003 - Military Working Dog Relocation
Pago Bay
Agat Bay
NAVAL MUNITIONS
Pacific Ocean
Cocos Lagoon
Figure 2-1 CURRENT AND FUTURE DPRI PROJECTS - GUAM OVERVIEW
Miles
Kilometers
FOR OFFICIAL USE ONLY
NAVFAC
Legend
Future Projects (Construction Footprint)
Guam Routes
DOD Lands

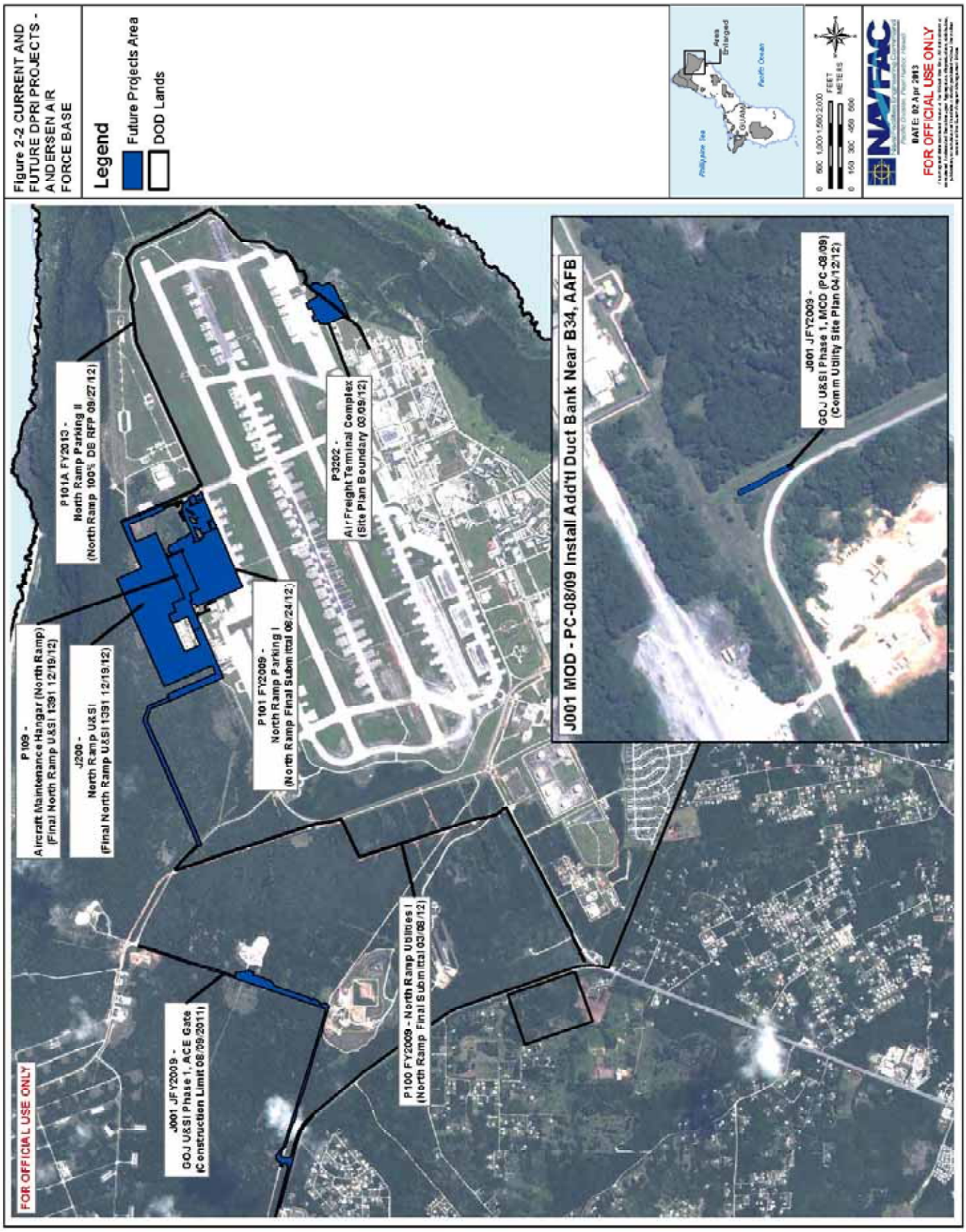


Figure 2-2 CURRENT AND FUTURE DPRI PROJECTS - ANDERSEN AIR FORCE BASE
Legend
Future Projects Area
DOD Lands
Philippine Sea
Pacific Ocean
GUAM
Area Enlarged
0 500 1,000 1,500 2,000 FEET
0 150 300 450 600 METERS
NAVFAC
FOR OFFICIAL USE ONLY
DATE: 02 Apr 2013
FOR OFFICIAL USE ONLY
P109 - Aircraft Maintenance Hangar (North Ramp) (Final North Ramp U&SI 1391 12/19/12)
J290 - North Ramp U&SI (Final North Ramp U&SI 1391 12/19/12)
P101A FY2013 - North Ramp Parking II (North Ramp 100% DB RFP 09/27/12)
P101 FY2009 - North Ramp Parking I (North Ramp Final Submittal 08/24/12)
P3202 - Air Freight Terminal Complex (Site Plan Boundary 03/09/12)
J001 JFY2009 - GOJ U&SI Phase 1, ACE Gate (Construction Limit 08/09/2011)
P100 FY2009 - North Ramp Utilities I (North Ramp Final Submittal 03/08/12)
J001 MOD - PC-08/09 Install Add'tl Duct Bank Near B34, AAFB
J001 JFY2009 - GOJ U&SI Phase 1, MOD (PC-08/09) (Comm Utility Site Plan 04/12/12)

The North Ramp utility fire protection system consists of a separate high-pressure water supply system to support automatic fire suppression systems and domestic water supply system consisting of water mains with fire hydrants. The water infrastructure includes networks of water main lines and laterals, gate valves and boxes, reducers, meters, check valves, fire hydrants, and storage tanks. The wastewater infrastructure includes a network of sewer trunk lines and laterals, lift stations, manholes, and cleanouts.

The roads and street infrastructure will include networks of road systems consisting of local asphalt roads with appropriate roadway stormwater runoff appurtenance including low impact development (LID) integrated management practices. The ground improvements will include a drainage system consistent with the U.S. Marine Corps North Ramp Area Development Plan and the stormwater pollution prevention plan.

Proposed Operations

There are currently no operational or support facilities available at AAFB North Ramp to support 1st Marine Air Wing (MAW) operations. The site improvements, grading, and utility infrastructure development is required to prepare the North Ramp site for vertical construction essential to support 1st MAW operational, maintenance, administrative, and support facilities.

2.2.2 AAFB North Ramp Utilities (P-100)

Proposed Construction

The North Ramp Utilities P-100 project includes the water and wastewater improvements to extend and replace portions of the existing water and wastewater infrastructure to accommodate increased demands associated with the U.S. Marine Corps Aviation Unit's personnel, activities, facilities, and operations (Figure 2-2).

The project upgrades, extends and/or replaces portions of the utility infrastructure, communication, jet fuel, water (domestic and fire protection), and sewer systems to fulfill increased demand due to increased personnel, facilities, and operations associated with the relocation of U.S. Marine Corps aviation unit personnel and activities to the North Ramp Area of AAFB.

Project constructs a communications duct bank from the AAFB communications plant to the North Ramp area. Project installs new aircraft fuel distribution pipes, connecting to the existing fuel farm and extending pipes to four new fueling hydrants located on the north side of the new parking apron (P-101). In addition the project includes a leak detection/alarm system.

Proposed Operations

The North Ramp Utilities P-100 supports the increased demands associated with the U.S. Marine Corps Aviation Unit's personnel, activities, facilities, and operations (Figure 2-2). However, the movement of Marines to Guam from Okinawa is not expected to occur for several years. The relocation of Marines will occur once the facilities currently under analysis in the SEIS have been completed, and any future Section 7 consultations associated with the SEIS (i.e., covering those actions occurring post-2015) will address these operations.

2.2.3 AAFB North Ramp Parking (P-101 – also includes P-101A)

Proposed Facilities

The North Ramp Parking project (Figure 2-2) involves the demolition of all existing pavements, facilities, and utilities within the project area, and the construction or installation of:

- Approximately 99,000 m^2 MV-22 aircraft Portland Cement Concrete (PCC) parking apron. The concrete within the parking spots require continuous reinforcement to reduce the number of joints taxiway and shoulder paving.
- Parking spots coated with sodium silicate to mitigate heat from MV-22 engines.
- Hot Mix Asphalt (HMA) apron replacement pavement. Portions of the existing asphalt apron will be milled completely and rebuilt with new HMA pavement and base course.
- Aircraft wash-rack facility which includes a utilities control building for pumps, detergent storage, controls and equipment, and PCC pavement and HMA Apron Access pavement.
- High-mast lighting for the apron work, airfield edge lighting and lighted signs.
- Utility support building built on reinforced concrete foundation with roof constructed of cast-in-place concrete beams and slabs.
- Mechanical services including wastewater collection, water services, storm water collection and treatment.
- Flightline perimeter fence reconstructed and expanded to include the North Ramp and future hangar.

Proposed Operations

The facilities constructed at AAFB may be used by up to 12 permanently stationed MV-22 tiltrotor aircraft and will accommodate the loading of additional transient aircraft. These aircraft will conduct training and operational flights (sorties). However, the movement of Marines to Guam from Okinawa is not expected to occur for several years. The relocation of Marines will occur once the facilities currently under analysis in the SEIS have been completed, and any future Section 7 consultations associated with the SEIS (i.e., covering those actions occurring post-2015) will address these operations.

2.2.4 Aircraft Maintenance Hangar – North Ramp (P-109)

Proposed Facilities

The North Ramp Air Maintenance hangar project will provide site improvements, clearing, earthwork (cut and fill), utilities, roadways, privately owned vehicle (POV) parking, and other improvements for the construction of an aviation maintenance hangar (71,408 SF) at AAFB (Figure 2-2).

The hangar will be comprised of high bay spaces, crew and equipment spaces, and administrative spaces. Electrical systems include power, emergency power, lighting, telecommunications, intercommunications/public address, grounding, lightning protection, and electronic security systems. Mechanical systems include fire alarm and suppression including aqueous film-forming foam system and containment, plumbing, HVAC, and compressed air. Buildings will be constructed with walls, flooring, foundation, windows, roofing, mechanical, electrical, emergency power, and information systems appropriate to Guam earthquake and environmental conditions, and designed to meet applicable Unified Facilities Criteria including appropriate Anti-Terrorism/Force Protection (AT/FP) requirements.

Facilities will be equipped with automatic fire sprinklers and air conditioning or ventilated as appropriate. The project will provide POV and government owned vehicle parking.

Project includes site preparation, roadway pavements, parking areas, area lighting, sidewalks, LID strategies, landscaping, storm drainage features and the clearance of MEC/UXO removal.

The site preparation will consist of clearing/grubbing, grading, disposal, and in-fills prior to installation of the utilities infrastructure, ground improvements roads, and streets. The electrical infrastructure will include networks of primary feeders installed in ducts and manholes, as well as street lighting with associated service equipment.

The communication infrastructure will include ducts and manholes for future and current communication cabling and fiber optic lines requirements. Communication infrastructure includes the communication cabling and fiber optic lines.

The water infrastructure includes networks of water main lines and laterals gate valves and boxes, reducers, meters, check valves, and fire hydrants.

The roads and street infrastructure will include networks of road systems consisting of local asphalt roads, with appropriate roadway stormwater runoff appurtenance including low impact development integrated management practices. Sidewalks will be provided for pedestrian circulation.

Proposed Operations

The facilities constructed at AAFB may be used by up to 12 permanently stationed MV-22 tiltrotor aircraft and will accommodate the loading of additional transient aircraft. These aircraft will conduct training and operational flights (sorties). However, the movement of Marines to Guam from Okinawa is not expected to occur for several years. The relocation of Marines will occur once the facilities currently under analysis in the SEIS have been completed, and any future Section 7 consultations associated with the SEIS (i.e., covering those actions occurring post-2015) will address these operations.

2.2.5 Air Mobility Campus Terminal (P-3202)

Proposed Facilities

The Air Embarkation Project includes the AMC, Organic Marine Corps Cargo, and passenger operations. The 28-ac (11-ha) project site is adjacent to the southeast boundary of the installation (Figure 2-2). The site currently includes paved airfield parking and disturbed land adjacent to the airfield. This site would serve as the passenger terminal for AAFB and temporary cargo storage.

Proposed Operations

Air Embarkation/Disembarkation refers to the loading and unloading of passengers or cargo to and from aircraft. The passenger facilities are comparable to those of a small airport: luggage handling, waiting area, and ticket/documentation area. Cargo is staged in the area awaiting loading to aircraft or disbursement to warehouses or individual commands. There are biosecurity searches of cargo and baggage. Currently the Air Force has Air Embarkation facilities at South Ramp of the airfield and a new joint-use Air Embarkation site is proposed. The site would operate 24 hours/day and 7 days/week. Staffing levels are to be determined and would be contingent upon surge and operational requirements.

2.2.6 Utilities and Site Improvements, Phase 1: Aviation Combat Element (ACE) Gate (J-001)

Proposed Facilities

The ACE Gate Project scope is to upgrade the existing utilities to support the Marine Corps embarkation capability on Guam (Figure 2-2).

Key features of the project include:

- Entry Control Facility including all mechanical, electrical, lighting, closed circuit television, intrusion detection system, telephone, local area network (LAN)/data, pad mounted transformer, 13.8KV line extensions, secondary electrical services and feeders, fire protection systems, emergency generator and building, and all appurtenant facilities for a functional system.

- Pass & ID Office including all mechanical, electrical, lighting, closed, circuit television, intrusion detection system, telephone, LAN/data, and secondary electrical feeders, Vehicle Inspection Facility, fire protection systems, and all appurtenant facilities for a functional system.

- Vehicle Inspection Facility, fire protection systems, and all appurtenant facilities for a functional system.

- Vehicle Queuing Control Facility with Canopy including all, mechanical, electrical, lighting, closed circuit television, intrusion, detection system, telephone, LAN/data, secondary electrical feeders from the Vehicle Inspection Facility, fire protection systems, and all appurtenant facilities for a functional system.

- Vehicle Inspection Facility (VIF) including all mechanical, electrical, lighting, closed circuit television, under-carriage vehicle surveillance system, intrusion detection system, telephone, LAN/data, pad mounted transformer, 13.8KV line extensions, secondary electrical services and feeders, fire protection systems, emergency generator and building, and all appurtenant facilities for a functional system.

- Overwatch Station including all mechanical, electrical, lighting, closed circuit television, intrusion detection system, telephone, LAN/data, secondary electrical feeders from the VIF, fire protection systems, and all appurtenant facilities for a functional system.

- Telecommunication cabling, ductlines and manholes along access road and connection to the ITN building, Building 2616 and the Security Forces Building.

- Closed Circuit Television (CCTV) System expansion at the Security Forces Building and interconnect with the new CCTV System to be installed in this project.

- Roadway improvements and modifications along Route 9 including, but not limited to widening of Route 9 for additional lanes and shoulders, clearing and grubbing, erosion controls, demolition, paving, traffic signals, street lighting, drainage improvements, guardrail, striping, and all other required appurtenant items. All work for the installation of the traffic signal system shall conform to the "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects," dated 2003 and as amended by the Guam Department of Public Works.

- Access roads, including site clearing and grubbing, demolition, erosion controls, paving, street lighting, CCTV, drainage improvements, and all other required appurtenant items of work.

Proposed Operations

The ACE Gate project is intended to improve the traffic flow and the physical security of vehicles traveling to and from AAFB. The electronic control point would be a commercial and POV access gate for the ACE Ramp and Air Force Guam Forward Loading Operation Ramp. It is anticipated that the gate would operate 24 hours a day and 7 days a week. The existing South or Main Gate averages 11,000 vehicle movements per day. Similar traffic loads are assumed for the proposed North Gate based on personnel working at Intelligence, Surveillance, and Reconnaissance (ISR)/Strike, Marine Corps North Ramp, and overflow from the already congested South Gate of AAFB. It is assumed that the traffic load would include 200+ trucks and construction vehicles per day.

2.2.7 Utilities and Site Improvements, Phase 1: Apra Harbor (J-001)

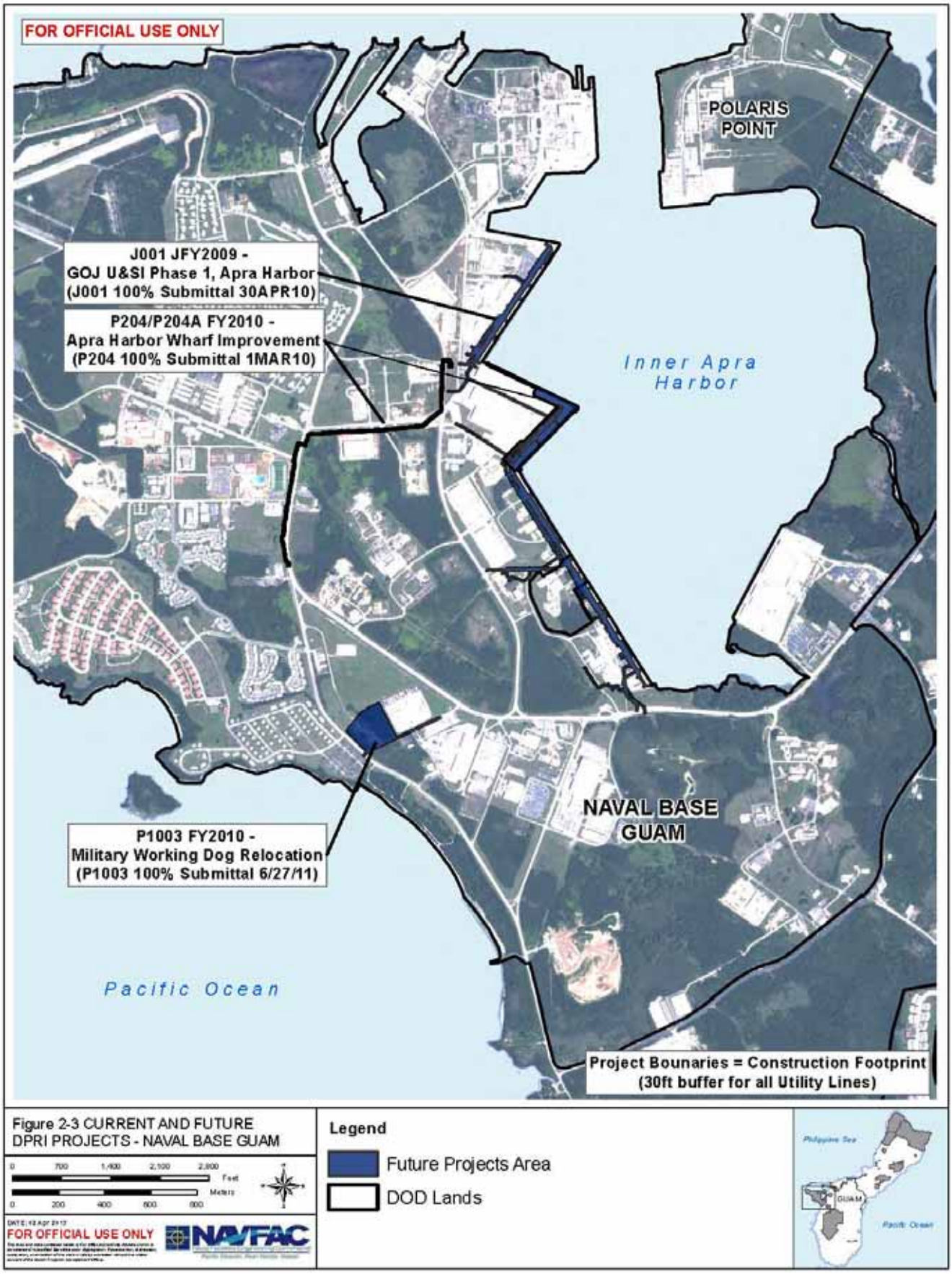
Proposed Construction

The Apra project scope is to upgrade the existing utilities to support the Marine Corps embarkation capability. The project will provide shore side utility improvements from the Sierra Wharf to Victor Wharf at the Naval Base Guam, Apra Harbor (Figure 2-3).

Key features of the project include:

- The addition of a 34.5 kV-13.8 kV primary substation transformer and 13.8 kV switchgear at Orote Substation.

- Sierra Wharf – Construction of two double-ended 13.8 kV delta to 480 volt delta substations including primary and secondary switchgear and feeders, standby generator building for lighting systems, wharf and perimeter fence lighting, utility building, Bilge Oily Waste (BOW) Treatment Plant, BOW Pumping Station, and upgrading of Sewage Pumping Station No. 21.


FOR OFFICIAL USE ONLY
POLARIS POINT
J001 JFY2009 -
GOJ U&SI Phase 1, Apra Harbor
(J001 100% Submittal 30APR10)
P204/P204A FY2010 -
Apra Harbor Wharf Improvement
(P204 100% Submittal 1MAR10)
Inner Apra Harbor
NAVAL BASE GUAM
P1003 FY2010 -
Military Working Dog Relocation
(P1003 100% Submittal 6/27/11)
Pacific Ocean
Project Bounaries = Construction Footprint
(30ft buffer for all Utility Lines)
Figure 2-3 CURRENT AND FUTURE DPRI PROJECTS - NAVAL BASE GUAM
Legend
Future Projects Area
DOD Lands
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- Uniform Wharf – Construction of a single-ended 13.8 kV delta to 480 volt delta substation including primary and secondary switchgear and feeders, standby generator building for lighting systems, and wharf and perimeter fence lighting.

- Victor Wharf – Construction of three double-ended 13.8 kV delta to 480 volt delta substations including primary and secondary switchgear and feeders, one double ended 13.8 kV delta to 4.16 kV delta substation including primary and secondary switchgear and primary feeders, standby generator building for lighting systems, wharf and perimeter fence lighting, BOW Pump Stations, a Utility Building that will house Compressed Air/Steam/Demineralized Water Systems, and a Welcome Center. The work at Victor Wharf also includes the electrical aspects of upgrading the existing BOW Treatment Plant, and Sewage Pumping Station No. 23.

- Demolition of Substation Buildings Sierra 1 and Sierra 2 including transformers, primary and secondary switchgear and related wiring.

- Demolition of Substations Victor 2 and Victor 3. These substations are outdoor substations on concrete equipment pads enclosed by chain link fences.

- Potable Water System - Install a new 300 mm (12 in.) water line along Sierra, Tango, Uniform.

Proposed Operations

The Apra project scope is to upgrade the existing utilities to support the Marine Corps embarkation capability.

2.2.8 Apra Harbor Wharf Improvements I (P-204 – also includes P-204A)

Proposed Construction

The wharf improvements project at the Uniform and Tango Wharf within the Apra Harbor Naval Base in Guam (UT Wharf Project) involves the strengthening of Uniform Wharf and a portion of Tango Wharf and the demolition of small boat mooring facilities located at the west end of Uniform Wharf (Figure 2-3). The project also includes the provision of a new concrete wharf operation deck and utilities.

Specific work includes:

In-Water Wharf Improvements

- Strengthen Uniform Wharf (approximately 63 m (207 ft) wide and 375.83 m (1232 ft) long) and portion of Tango Wharf approximately 33.5 m (110 ft) wide and 364 m (1195

ft) long) by installing a new king pile/sheet pile wall, concrete bulkhead, and site soil improvements.

- Demolish small boat mooring facilities located at the west end of Uniform Wharf.
- Provide new concrete wharf operations deck at the strengthened portion of the wharves and provide cathodic protection system for the wharves.

Mooring and Berthing System

- Provide new fenders and support system at Uniform and Tango Wharves (3,300 dia. X 4,500 fenders will be Government-furnished-contractor-installed and 2,000 dia. X 4,500 fenders will be contractor furnished and installed).
- Provide new mooring hardware at Uniform Wharf and the strengthened portion of Tango Wharf.
- Provide storm bollards and foundations at Uniform Wharf.

Utilities and Wharf Storm Drain Systems

- Provide new concrete utility trenches at the strengthened portion of the wharves to accommodate potable water, sewer, and BOW lines and future steam, compressed air and demineralized water lines.
- Replace BOW lines on Uniform Wharf and potable water and sewer lines on Uniform and Tango Wharves.
- Provide new ship connection riser/stations at predetermined locations on the wharves.
- Install fire hydrants, slotted drains, storm drain lines, treatment units, and outfalls to prevent contaminated surface runoff into the harbor.

Electrical

- Provide two shore power outlet assemblies at Uniform Wharf including ducts and cables from new Government Utilities and Site Improvement Uniform Wharf Substation.
- Extend underground electrical duct lines from Uniform Wharf and through the strengthened portions of Tango Wharf, and temporarily relocate and install air conditioning units currently in the way of the new work.
- Provide two telecommunication risers at Uniform Wharf and three on Tango which includes the installation of an underground empty conduit system including but not limited to manholes, innerducts, and telecommunication risers.

Site Improvements

- Provide fencing, site demolitions, paving and other miscellaneous site work.

Proposed Operations

The wharf improvements project at the UT Wharf Project is to upgrade the wharf to support the Marine Corps embarkation capability. Nothing beyond normal day to day port operations will be occurring between now and 2015, and the proposed Marine embarkation actions won't be occurring until after 2015.

2.2.9 Working Dog Relocation (P-1003)

A new Military Working Dog Kennel (MWDK) is proposed to replace the one within the Security Compound at Victor Wharf (Figure 2-3).

Proposed Facilities and Construction

The proposed MWDK facility is to the west of the existing facility that is near Victor Wharf (Figure 2-3). The proposed site is currently used for a temporary laydown area for base maintenance contractors. There are Conex containers on site that would be relocated and no demolition at the site is required. Access to the site would be from existing roads and utilities would tie into the utilities along the roadways. Area of grading/grubbing would be approximately 2 ac (0.8 ha) and landscaping would be required for 1.5 ac (0.6 ha).

The proposed MWDK facility would include a 2,040 ft^2 (190 m^2) single-story building that would provide space for dog kennels for 10 military working dogs (includes both indoor and outdoor runs), four quarantine runs, two tack rooms, bulk storage area, food storage and preparation areas, administration space for 13 personnel, bathroom, locker room, veterinary exam area, multi-purpose conference/break area, outdoor dog wash, parking, circulation space, a mechanical equipment room, and exterior enclosure for dehumidification equipment, and relocation of the existing explosive/hazardous material locker (Golan 10 locker). The locker would generate a 20-ft (1.9-m) radius ESQD arc. There would be an outdoor obedience/training course (22,500 ft^2 [2,090 m^2]), exercise area (800 ft^2 [74 m^2]) and break area (200 ft^2 [19 m^2]), all with self closing/self-latching gates. The project would provide Intrusion Detection System at the gate and building door entrances.

The project provides for electrical and mechanical systems including fire alarm and fire monitoring/control panels, information systems, telephone, Energy Management Control Systems, plumbing, fire protection systems, and heating, ventilation, and air conditioning systems. Information systems include telephone and data. Utilities at the site would include power, emergency generator, water, and wastewater. Utility tie-in would be at Shoreline Drive.

The facility would meet Leadership in Energy and Environmental Design (LEED) Silver standards and comply with Energy Policy Act 2005 requirements.

Proposed Operations

The military dogs are required for explosive/narcotic detection, antiterrorism/force protection. The dogs live and train at the kennel and are provided indoor and outdoor runs. There is one handler assigned to each dog and they train and deploy as a team. There are typically nine teams in residence at the kennel, but the schedule is mission driven and unpredictable.

Training is done on site during the day and at night in outdoor obedience training courses. Working hours for the staff are generally 0800 to 1700; however, evening missions would require staff. The dogs also train at other training facilities on-island and the frequency is dependent on the use of the other facilities. There are six patrol cars on site for transporting the dogs. Training aids include narcotics and explosives which are stored and handled in accordance with DoD regulations.

2.2.10 Defense Access Roads - Various Locations (P-1006)

The proposed road projects on Guam would enable and improve roadway connectivity, capacity, and pavement strength for military construction and deployment in support of the relocation (Figure 2-4).

Table 2-1. Summary of Proposed Guam Road Projects*

*No.***	*Route*	*Segment Limits*	*Length ft (m)*	*Requirements*
CENTRAL				
1	1	Route 1/8 Intersection	940 (285)	Intersection improvements.
3	1	East of Route 4	85 (26)	Agana Bridge Replacement.
APRA HARBOR				
5	11	Route 1/11 Intersection	1,480 (448)	Intersection improvements.

Note: *All road projects would either involve minimal new vegetation disturbance (i.e., disturbance of grassy or previously disturbed areas directly adjacent to the existing road) or the disturbance would occur in habitat that is extremely unlikely to be used by federally listed species (i.e., previously disturbed areas within developed/urban areas of Guam; refer to Figure 2-4).

2.2.11 Tumon Maui Well Project

The Tumon Maui Well Repair project proposes to restore the well facilities back into service to support the immediate water demand from the military build-up (Figure 2-5). Site work consists of site grading and drainage, installing pipe support/pads, replacing existing fence and install new fence.

The project covers the repair of the well and the entire well facility from the lower to upper Tumon sites. The project will replace existing pump equipment with vertical multi-stage turbine pumps, surge control valves and variable frequency drives; replace existing disinfection system with chlorine gas disinfection system; replace existing air stripper water treatment system with Granulated Activated Carbon water treatment system to mitigate perchloroethylene and trichloroethylene contaminants; repair existing chlorinator building; construct electrical wall and ventilation screen wall; replace existing 250kW generator and associated fueling system and fuel tank containment structures; and provide a metered connection to Guam Waterworks Authority water lines along Marine Corps Drive.

Project includes various electrical, mechanical and plumbing work; repair of existing fence and construct additional fence; removal of hazardous materials; and site work. Electrical work consists of installing conduits & wiring, removal and disposal of conductors/panel boxes.

Mechanical and plumbing work consists of removal and disposal of existing well pumps, pipes, valves, fittings & other associated mechanical components; and replacing vertical turbine pumps, duplex sump pumps, pumphouse piping including valves and fittings, surge control valves, pressure relief and pump control valves, gate valves, water pipes, water meters, ventilation system, tunnel repairs and other associated mechanical & plumbing components.

2.2.12 Non-Live Fire Training Area - Andersen South

Andersen South Construction

The proposed project will result in the construction of a military operations in urban terrain training area, a portion of which will be a modular unit and another will be reconstructed from the existing unit; a logistics and administration area; a convoy course; an advanced motor vehicles operators course; an aviation training landing zone; an aviation and maneuver area landing zone; Pioneer Road; other range roads; a perimeter fence; main, secondary, and range road gates (Figure 2-6).

Andersen South Operations

Convoy operations, maneuver training for military operations in urban terrain, and general maneuver and air-ground operations will vary, but may occur up to 5 days per week, 45 weeks per year, day and night. Convoy operations will typically consist of 7 to 10 vehicles (e.g., high mobility multipurpose wheeled vehicles) traveling in tandem along an established course. Military operations in urban terrain includes transporting units to Andersen South by helicopter or vehicle, maneuvering toward the military operations in urban terrain complex on foot or in vehicle, and engaging in integrated training at the military operations in urban terrain complex.

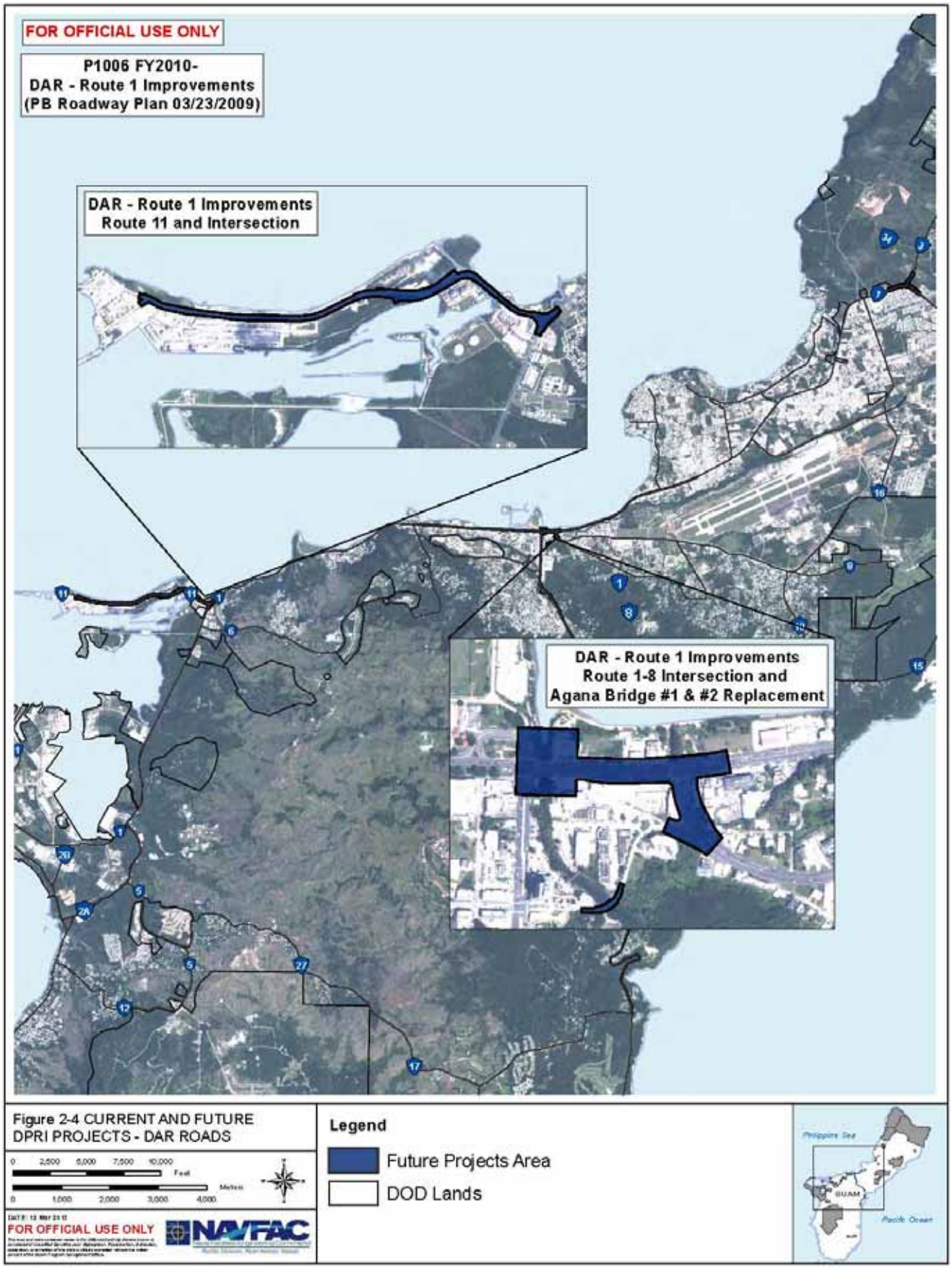
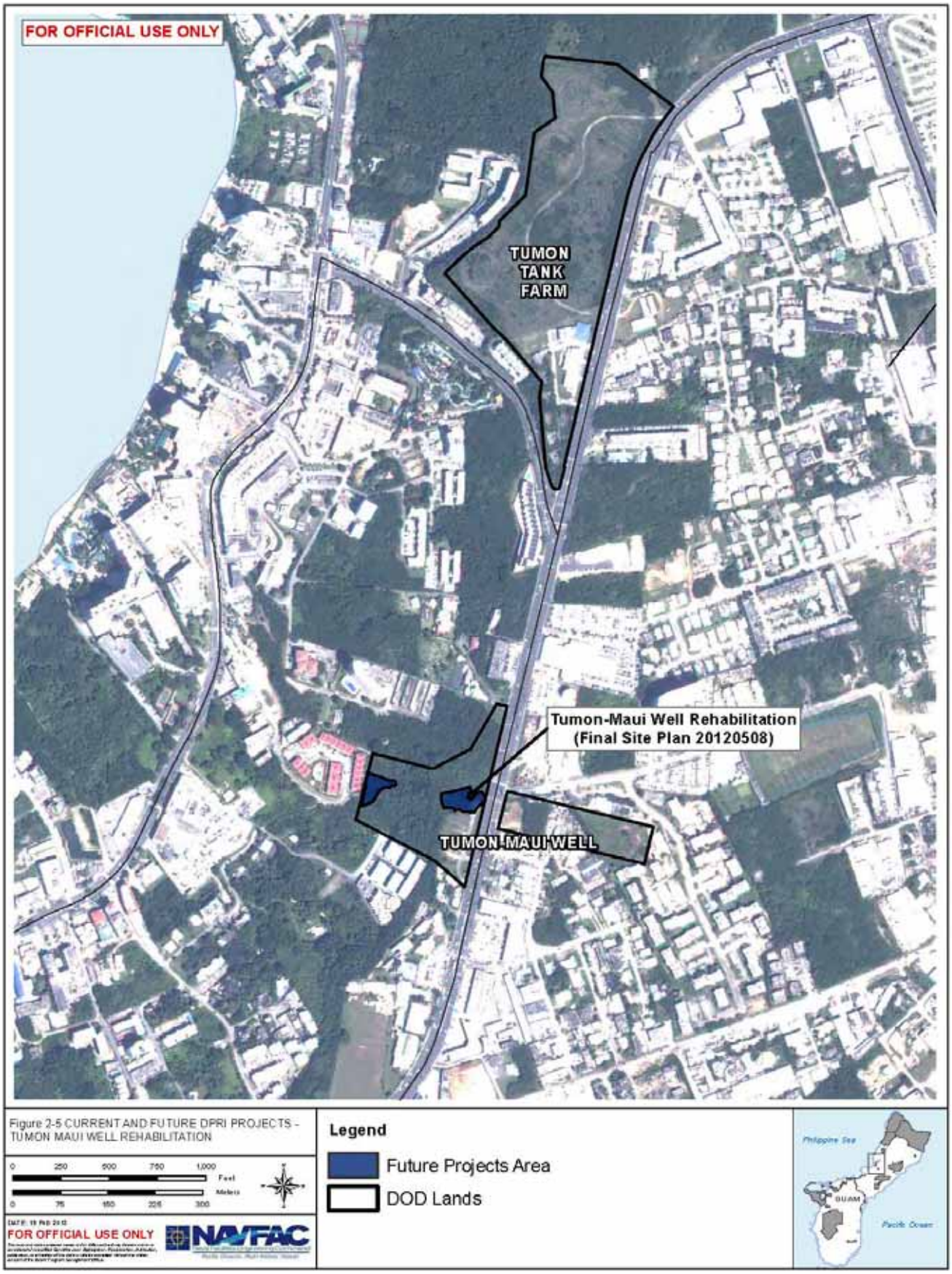


Figure 2-4 CURRENT AND FUTURE DPRI PROJECTS - DAR ROADS

Military operations in urban terrain at the reconstructed training area (also referred to as the urban embassy component) will consist of 24 or more, multi-story concrete structures to simulate at least four city blocks. The modular military operations in urban terrain (also referred to as the rural military operations in urban terrain) will consist of movable components that can be stacked and grouped into a number of configurations to present tactical situations to be overcome by training units. This modular military operations in urban terrain will be assembled on site to simulate a more rural village or set of suburban buildings located outside the core urban area. Forklifts or cranes will be used to reconfigure the modules of the military operations in urban terrain to add variety and diversity to training. The proposed military operations in urban terrain complex will include live-fire simulation ranges, including a breacher and shooting house that will be used for forced-entry training, and a hand grenade range and house. The military operations in urban terrain will operate both day and night. The military operations in urban terrain will be used by organizations based on Guam, transients, and visiting regional allied forces. Units using the military operations in urban terrain may bivouac in the vicinity, or arrive and depart daily.

Typically, dry runs and individual skills training will occur prior to the military operations in urban terrain exercise, which will involve fire teams (smallest unit of infantry, typically four or fewer individuals), and squad drills (a group of 8 to 12 individuals). Types of weapons that will be authorized for use at the military operations in urban terrain will include M16, M4, M249, and M240. Blanks, simulators, smoke grenades, diversionary devices (improvised explosive devices and booby traps that release smoke when activated), special effects small arms marking system (similar to paintball), and multiple integrated laser engagement system (small laser receivers scattered over the uniform of an individual soldier, which detect when the soldier has been shined by another soldier's firearm laser) are used to simulate ammunition and explosives that would be used in a real combat situation.

Tactical motor vehicle operator training is a continuous requirement for Marine units. The proposed advanced motor vehicle operations course will consist of a route along which a series of obstacles will be placed for driver trainees to negotiate. This will include obstacles simulating terrain features such as narrow bridges, serpentine courses, brake modulation blocks, river crossing, side slope, pot holes, curb and ditch crossing, humps (similar to moguls on a ski slope), and narrow urban driving. The obstacles are connected with unpaved roads. The advanced motor vehicle operations course facility will be used for individual, section, squad, or platoon training. An estimated 20 drivers per week will train at the advanced motor vehicle operations course, primarily with high mobility multipurpose wheeled vehicles. At two drivers per vehicle, an estimated 10 high mobility multipurpose wheeled vehicles will use the course during training events. Training activities will result in a potential increase in noise and wildfire threat.


FOR OFFICIAL USE ONLY
TUMON TANK FARM
Tumon-Maui Well Rehabilitation (Final Site Plan 20120508)
TUMON MAUI WELL
Figure 2-5 CURRENT AND FUTURE DPRI PROJECTS - TUMON MAUI WELL REHABILITATION
0 250 500 750 1,000 Feet
0 75 150 225 300 Meters
FOR OFFICIAL USE ONLY
NAVFAC
Legend
Future Projects Area
DOD Lands
Philippine Sea
GUAM
Pacific Ocean

Convoy training consists of simulated threats and tactical scenarios to train in various defensive techniques. This area of Andersen South is currently used by the Air Force for expeditionary airfield and military operations in urban terrain training which has similarities to the proposed maneuver area training. The convoy training course is 2.5 mi (4 km) and will use existing and new roadways (see Andersen South construction above) within areas identified for the maneuver training space. All existing roads will be open to motor vehicle use associated with maneuver area training; this will primarily be wheeled vehicles, but occasionally a tracked vehicle may be used in maneuver area training at Andersen South. The area will continue to support Air Force training, while also accommodating Marine Corps training requirements. Access to the site will be by vehicle or air lift. Air lifts will typically involve two to four CH-53 helicopters dropping off and picking up personnel twice a week.

Andersen South will support new landing zones for aviation training and include helicopter support team training for ground units. Personnel train in rappelling from the helicopter and procedures that will be used in inserting and extracting troops via helicopter at combat locations. The air operation events associated with this air-ground training will typically consist of a pass for orientation, followed by a downwind approach, hovering at 30 ft (9 m) above ground level for approximately one minute at a designated landing zone and a departure. Since the maneuver area aviation training operations will be a component of training to meet the aviation training requirements, they are also described below under aviation training. Helicopter-insertion extraction activities include fast rope, rappelling, helocasting, and parachute operations.

Helicopter insertion-extraction training operations will involve one pass for landing zone orientation, followed by an approach of the landing zone, hovering at approximately 30 ft (9 m) above ground level for approximately one minute, and then departing the landing zone. During each training event, approximately three helicopter insertion-extraction operations will be conducted at one or more closely located landing zones. Approximately 114 helicopter insertion-extraction events will occur at Andersen South per year. Confined area landing, external loads, and maneuver lift (see descriptions above) training will also occur on Andersen South at a frequency of 125, 63, and 720 events per year, respectively.

2.2.13 Hazard Analysis and Critical Control Point Planning

Hazard Analysis and Critical Control Point (HACCP) planning is a pathway management tool that provides a comprehensive method to identify risks and focus procedures to prevent spread of species through pathways. Construction work could unintentionally spread non-target (potentially invasive) species to new habitat. These non-targets could hitchhike on construction equipment or be included in shipments of materials and supplies from locations outside of Guam.

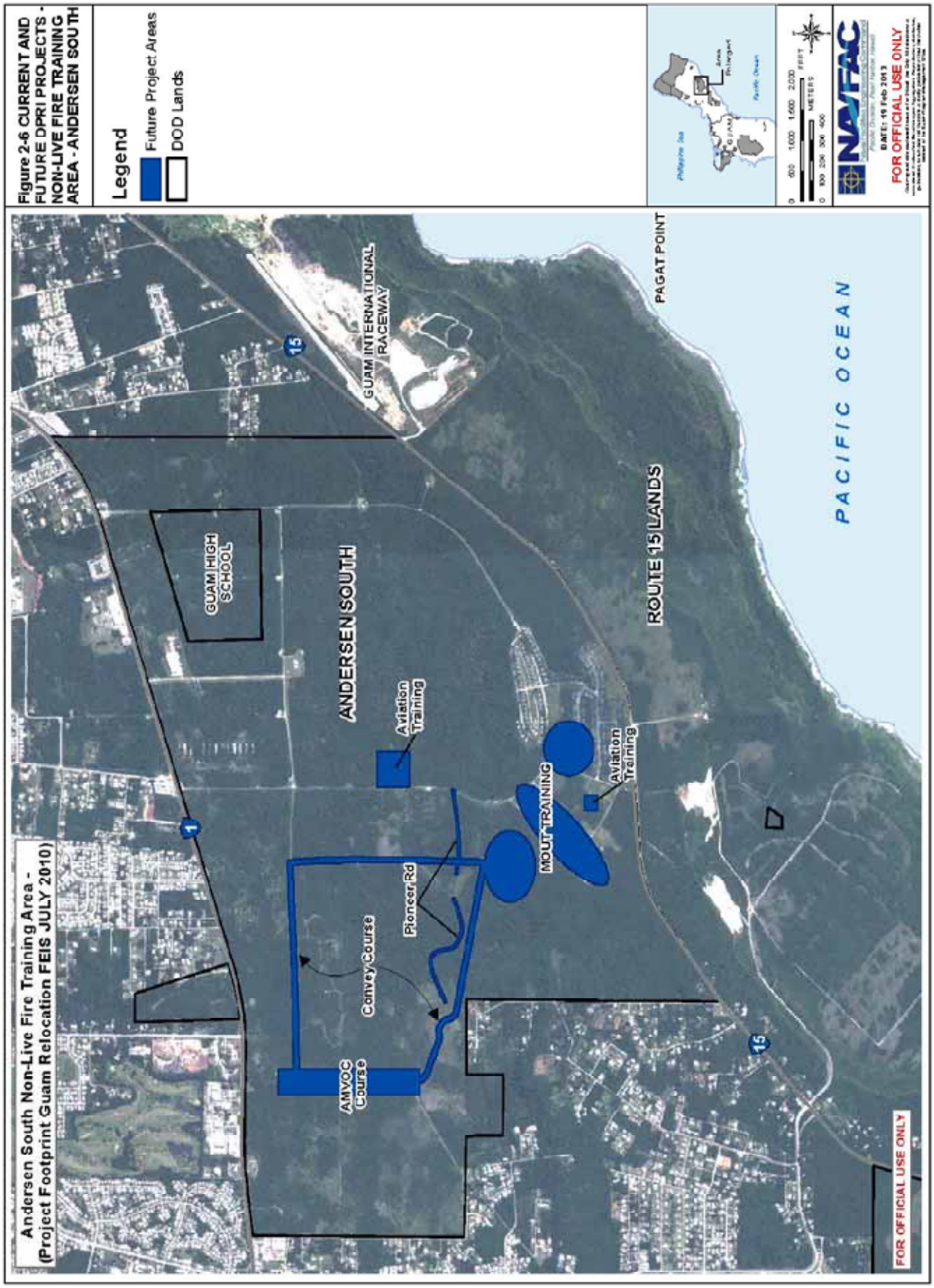


Figure 2-6 CURRENT AND FUTURE DPRI PROJECTS - NON-LIVE FIRE TRAINING AREA - ANDERSEN SOUTH
Legend
Future Project Areas
DOD Lands
Andersen South Non-Live Fire Training Area - (Project Footprint Guam Relocation FEIS JULY 2010)
GUAM HIGH SCHOOL
ANDERSEN SOUTH
GUAM INTERNATIONAL RACEWAY
PAGAT POINT
ROUTE 15 LANDS
PACIFIC OCEAN
Aviation Training
Aviation Training
MOUT TRAINING
Pioneer Rd
Convey Course
AMVOC Course
1
15
15
FOR OFFICIAL USE ONLY
FOR OFFICIAL USE ONLY
NAVFAC
DATE: 19 Feb 2013

The pathways used by invasive species to move into new locations are not always obvious. Many problematic species, diseases, and parasites have been transferred to new locations as undetected (and uplanned) hitchhikers. HACCP planning is a management tool that provides a structured method to identify risks and focus procedures. Understanding pathways and developing plans to reduce non-target species and prevent biological contamination is necessary to avoid unintended spread of species.

In August of 2011, the DON sponsored several HACCP training courses for DON employess and construction contractors. A HACCP Planning Overview for Managers was held on Monday, August 8, 2011 and 2 two-day HACCP Planning courses were held August 9 & 10 and August 11 & 12, 2011. Over 60 people attended the three courses. Additional trainings are held at the various project sites when there is worker turnover.

The DON has required all construction contractors to develop and implement HACCP plans for their construction activities. The construction contractors are to identify and implement control measures to prevent the inadvertent movement of non-native, invasive species to Guam and to and from the project site to other locations. The contractor is required to establish appropriate facilities that comply with all environmental laws and regulations, provide training for proper vehicle hygiene, and promptly take corrective and preventative actions for noncompliance. This includes vehicle washdown and inspection for soil and other materials and appropriate control measures are implemented to prevent the inadvertent movement of non-native invasive species from the project site to other locations.

Construction contractors are required to provide documentation that supports prevention, worker awareness training, and control of non-native invasive and pest species in the project area and efforts to prevent the movement of non-native invasive species to areas outside the project area, whether in a purposeful or inadvertent manner. The contractor is responsible for ensuring that their employees receive applicable environmental and occupational health and safety training, and keep up to date on regulatory required specific training for the type of work to be conducted onsite. This may include, but is not limited to HACCP planning, species- (e.g., brown treesnake and coconut rhinoceros beetle) specific information, regulated pest list, threatened and endangered species information, and proper washdown and inspection techniques for equipment.

2.2.14 Baseline Monitoring

To document the effectiveness of the HACCP implementation at construction sites, the DON has developed and implemented a long term monitoring program for terrestrial vegetation, invertebrates and vertebrates on Guam. For any clearing of vegetation that is adjacent to or contiguous with native habitat, the perimeter and 98.4 ft (30 m) into the habitat will be surveyed to identify vegetation community, vertebrate and invertebrate species composition.

The DON contracted a baseline ecosystem monitoring study for projects on AAFB in 2011. Transects were focused on areas where newly introduced species are most likely to occur. The intent of the project was to establish a baseline of both native and non-native plants, vertebrates and invertebrates present prior to the beginning of planned construction activities. This baseline will serve as a reference for subsequent monitoring efforts conducted concurrently with construction in order to aid in evaluating the success of implemented HACCP plans. The baseline will also provide a basis of comparison for relative abundances of invasive species during construction, as well as whether any species detected during long-term monitoring are newly introduced or were present prior to the beginning of construction. The project was completed in December 2012.

2.3 Conservation Measures to Minimize Potential Effects to the Mariana Fruit Bat

The following sections describe the conservation measures the DON would implement to minimize effects on listed species due to proposed construction and operations. Conservation measures are actions intended to benefit or promote the recovery of listed species that are included by the Federal agency as an integral part of the proposed action. These actions will be taken by the Federal agency or applicant, and serve to minimize or compensate for, project effects on the species under review.

2.3.1 Mariana Fruit Bat Surveys

One week prior to any clearing of vegetation, the Biological Monitor will survey the delineated limits of construction to determine if any Mariana fruit bats are present. The Biological Monitor will have experience in the identification of Mariana fruit bats by sight, sound, and roosting behaviors.

i. If a Mariana fruit bat is present within 492 ft (150 m) of the project site, the work must be postponed until the bat has left the area.

ii. The presence of a listed species will be reported to the U.S. Fish and Wildlife Service and Guam Division of Aquatic and Wildlife Resources within 48 hours, but the location of species will not be revealed to any other outside party.

2.3.2 Mariana Fruit Bat Recovery Actions on Rota

In September of 2011, the DON awarded a Cooperative Agreement to the University of Montana for Mariana fruit bat recovery actions on Rota. The project focus and deliverables align with recovery actions contained within the Draft Revised Recovery Plan for the Mariana Fruit Bat (citation for works cited). Recovery actions supported by the University of Montana include: (1) synthesizing recent research in order to update the recovery goals in the Recovery Plan, (2) conducting population genetics using fruit bat fecal samples as a source of fruit bat Deoxyribonucleic acid, (3) establishing a standardized monitoring protocol, and (4) encouraging education and involvement of local communities at multiple levels. This project is expected to be completed in June of 2013.

2.4 CONSERVATION MEASURES FROM THE ORIGINAL BIOLOGICAL OPINION THAT HAVE BEEN INITIATED

The conservation measures described in Section 2.3 avoid or minimize the impacts expected to occur as part of the revised Proposed Action (2010-2015). This section describes the conservation measures that were included in the September 8, 2010 BO as part of the original Proposed Action but are not being applied as conservation measures to the current Proposed

Action. These conservation measures are being included in this BA to document the measures conducted to date. The measures listed below may be used as conservation measures for future DON Section 7 requirements on Guam.

2.4.1 Micronesia Biosecurity Plan

To address pathways and encourage a more holistic approach to managing invasive species, the DON has funded the development of the Micronesia Biosecurity Plan (MBP). Individual activities for various species will continue, but the DON and others agree it is more efficient to manage pathways and prescribe corrective measures for a suite of species which will be monitored at discrete control points through time. The MBP will provide agencies with a platform for coordination and integration of inter-agency invasive species management efforts such as control, interdiction, eradication, and research.

1. Phase I Risk Assessments: DON contracted with the National Invasive Species Council to develop and coordinate risk assessments for the MBP in cooperation with the U.S. Department of Agriculture (USDA) Wildlife Services, USDA APHIS Plant and Protection and Quarantine, USDA APHIS Veterinary Services (terrestrial); U.S. Geological Survey Biological Resources Discipline (freshwater); and Smithsonian Environmental Research Center (marine).

2. Phase II Peer Review and Strategic Implementation Plan: In September of 2011, DON entered into a Cooperative Agreement with the University of Guam (UoG) to develop Phase II of the MBP. UoG has been tasked with reviewing all three sections of the MBP and providing an assessment as to whether the three sections are comprehensive within their respective environment and sufficiently address risks posed to Micronesia and Hawaii. UoG and its resource expert collaborators are evaluating each section of the MBP to ensure the plan sufficiently:

a) evaluates the biosecurity risks particular to each environment;

b) addresses organisms to be of greatest risk to Micronesia and Hawaii (as it relates to Micronesia);

c) identifies the necessary elements of an effective biosecurity program;

d) identifies management responses that are the most appropriate and have been described and prioritized in sufficient detail to allow for ease of implementation;

e) incorporates the input of the relevant regional entities with responsibilities for biosecurity.

If the MBP does not adequately address specific biosecurity concerns raised by relevant regional entities, the review shall identify solutions to address these concerns.

UoG is also tasked with developing a Strategic Implementation Plan based on the results of MBP research components and subsequent independent peer review of the science and recommendations. The Strategic Implementation Plan is to:

a) identify and analyze challenges to regional implementation of the MBP and provide multiple implementation alternatives, where appropriate;

b) identify infrastructure, funding, processes, political, legislative, policy and capacity gaps within the various region's agencies and jurisdictions relevant to potential invasive species pathways;

c) identify policy and regulatory changes needed to achieve 100 percent prevention, control and treatment for the identified highest risk pathways, ports of origin, and species for the region;

d) evaluate the technical and institutional capacity (staff, training, etc.);

e) assess infrastructure needs;

f) coordinate with related initiatives; seek out successful models, assistance and collaboration from organizations involved in invasive species management; analyze biosecurity program implementation elsewhere and assess applicability to Micronesia region;

g) target outreach and awareness;

h) identify potential long-term funding mechanisms;

i) identify methods for measuring success/effectiveness, as well as the labor/equipment costs, in U.S. dollars, required to maintain those methodologies;

j) address improvement of biosecurity protection actions;

k) address biological threats associated with enhanced military activities, tourism, trade, business and the economic growth;

l) recommend solutions to challenges;

m) recommend strategies (and associated budgetary needs to implement each strategy) to achieve 100 percent prevention, control and treatment for the identified highest risk pathways, ports of origin, and invasive species for the region;

n) provide a template to realistically implement the biosecurity strategies identified in the MBP in the United States and within international frameworks.

2.4.2 Brown Treesnake Control

The DON has initiated support for large-scale, long-term efforts to refine methods for brown treesnake control that will reduce the snake population on a landscape level more cost-effectively and increase the efficacy of capturing snakes in low-density situations. In early fiscal year (FY) 2012, the DON coordinated with the USFWS, USDA, and USGS on priority BTS research projects. Subject matter experts identified 17 unique projects. The development of a bait formulation for BTS suppression was determined to be the highest priority research need. The USDA National Wildlife Research Center (NWRC) was funded at the start of FY13 to implement the bait formulation research.

An Interagency Service Agreement between Naval Facilities Engineering Command (NAVFAC) PAC and USDA-NWRC was signed on 30 August 2012 to facilitate the bait formulation research."

2.4.3 Biosecurity Outreach and Education

DON has contracted for the development of biosecurity outreach and education materials. The contractor has designed and is producing an activity booklet, a tri-fold, two sided educational brochure with an associated poster that differentiates native from introduced species, defines invasive species, describes the known impacts of invasive species on native species and ecosystems, and what can be done to prevent and control invasive species. The brochure will serve to educate DoD employees and the public about current invasive species issues. The activity booklet is targeted towards elementary age children with a variety of activities, including but not limited to coloring, word search, connect the dots, for elementary school children, teaching them about invasive species.

2.4.4 Expansion of Orote Ecological Reserve Area (ERA)

Based on the 1983 EIS for the construction of an ammunition wharf at Adotgan Point in Outer Apra, a Memorandum of Understanding between the Navy and GovGuam identified several mitigation measures that would be taken to minimize adverse impacts to the environment, including establishment of an ERA on the southerly cliffs of Orote Peninsula. The Chief of Naval Operations established the Orote ERA in 1984 (NAVFAC Pacific 2007b).

In 1996, the Navy issued the *Guidelines for Establishment of Ecological Areas on Naval Reservations*. The Guidelines state these general objectives for ERAs:

- identify and protect examples of ecosystems and of physical or biological phenomena;
- provide research and educational opportunities for scientists in the observation and study of the environment;
- preserve the full range of biological diversity; and

- provide a basis for organized research and exchange of information on these areas.

The ERA was established following a watershed approach; including a Terrestrial Unit and a Marine Unit. The primary purpose of the ERA was to preserve the natural terrestrial and marine environments while permitting low impact recreational activities that conformed to Guam Department of Aquatic and Wildlife Resources (DAWR) fishing and hunting regulations. Permitted recreational activities are primarily beach activities including beach combing, swimming, snorkeling, and scuba diving (NAVFAC Pacific 2007b).

Under the Proposed Action, the Navy will be submitting a proposal to expand the existing boundaries of the Orote ERA (NAVFAC Pacific 2007b) based on the above guidelines. This proposed expansion would include protection of the Spanish Steps area which supports sea turtle nesting and Orote Island which supports nesting seabirds (Figure 2-7). The Orote ERA currently has a marine unit consisting of 133 ac (54 ha) and a terrestrial unit of 30 ac (12 ha). The proposal is to expand the existing Orote ERA to include Orote Island, Adotgan Point, and the Spanish Steps area, adding approximately 32 ac of terrestrial habitat to the ERA.

2.4.5 Ungulate Management

The Joint Region Marianas Ungulate Management Plan is under development and expected to be completed in 2013. The DON has communicated interim projects to the USFWS to begin important ungulate management actions. The DON will implement two complementary ungulate management projects on Naval Base Guam in 2013: 1) install approximately 4,400 feet of coated chain link fence along Route 2A on the perimeter of NBG; and 2) establish an agreement with the USDA to conduct ungulate control work on NBG. The fencing project is intended to effectively close off Orote pennisula from ungulate incursion and only entry control gates will be left unfenced. These gates are manned twenty-four hours a day/seven days a week. Funds were transferred to USDA in January and control work is scheduled to begin in April 2013.

The fencing project, in conjunction with USDA trapping efforts will reduce ungulate densities on NBG properties. Fence maintenance will periodically be conducted in the event storm damage or other influences (ie corrosion) dictate repair. The ultimate goal of the project is sustained suppression to levels that allow for forest regeneration and self-sustaining populations of native animals.

As part of the P-101 North Ramp parking project, a perimeter fence has been constructed around a heavily vegetated sinkhole. One round of ungulate control (with volunteers) was conducted in the fall of 2012. The fence may be removed to construct the ACE but the fence will be re-installed once construction is complete.

2.4.6 Wetland Restoration/Conservation

A feasibility study is being conducted at both Atantano and Camp Covington. Upon completion of the feasibility study, an implementation plan (with 4 comparable restoration alternatives for

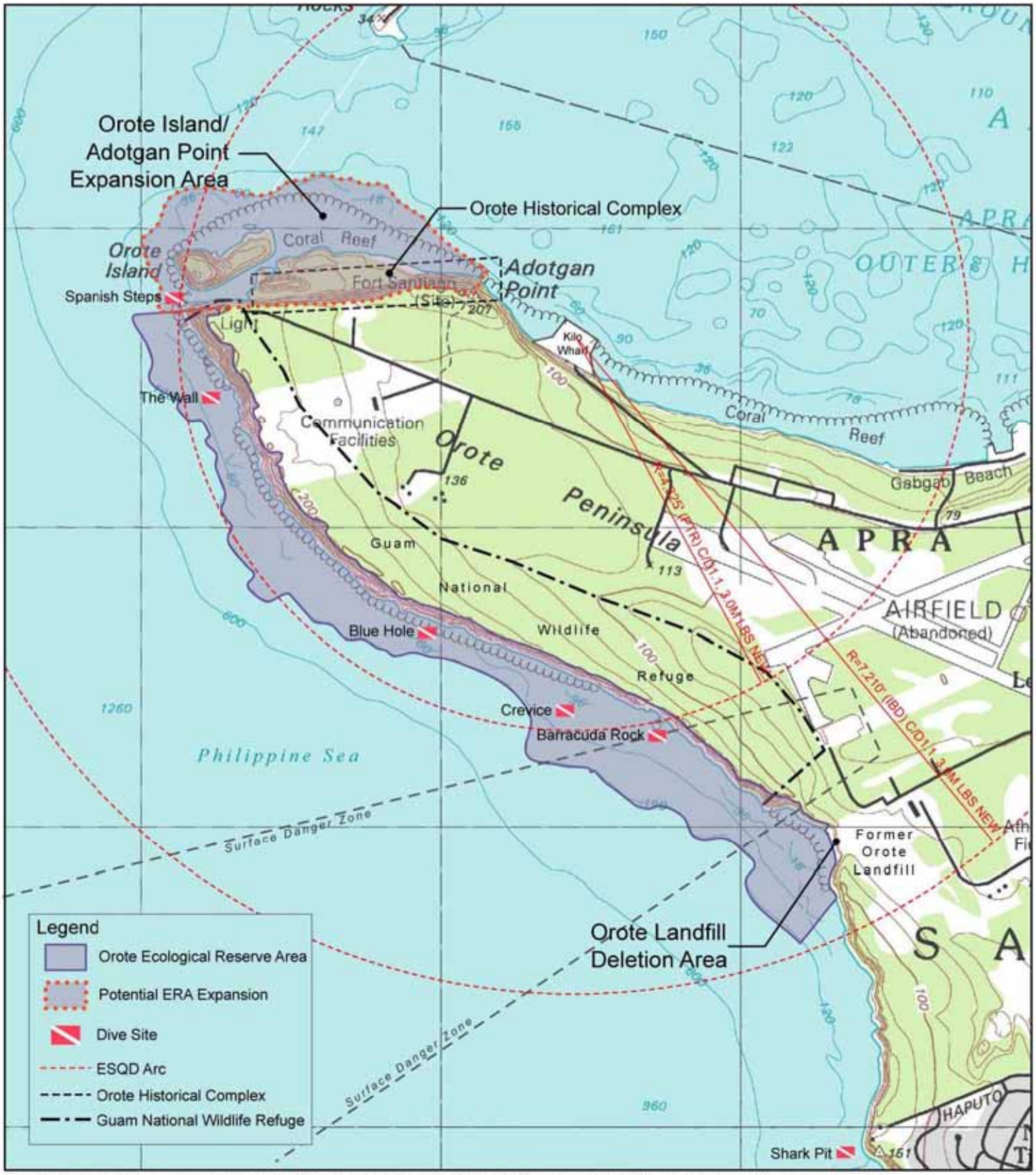
the selected wetland) will be developed and on the ground restoration will be initiated. The primary purpose of the restoration activities at Camp Covington and/or Atantano wetlands is to increase suitable habitat for the Mariana common moorhen.

2.4.7 Sea Turtle Public Outreach

The DON, in cooperation with DAWR, has undertaken an educational program to inform military and civilian personnel about sea turtle nesting and the potential impacts to the species from nest disturbance, direct harassment of sea turtles (in the marine and terrestrial environment), beach disturbance, and other threats. DON has contracted the development of an activity booklet for elementary school children, teaching them about sea turtle conservation and a tri-fold brochure.

2.4.8 Mitigation Tracking

The DON with the assistance of the USFWS has developed and implemented a methodology for tracking project actions including the timing and implementation of the conservation measures. The mitigation tracking database is revised and maintained by Joint Region Marians (JRM) with the assistance of NAVFAC Pacific. The spreadsheet includes individual tabs for each formal and informal consultation for Guam and the Commonwealth of the Northern Mariana Islands. The DON will update this annually.



Source: Orote ERA Establishment Report, 1984; Apra Harbor 1:24,000 USGS quadrangle, 2001. Elevation and depth curves in feet.

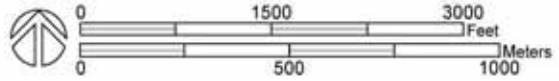


Figure 2-7 Location of Orote ERA and Proposed Expansion

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CHAPTER 3
DESCRIPTION OF EXISTING CONDITIONS AND AREAS TO BE AFFECTED BY THE PROPOSED ACTION

3.1 ACTION AREA

The Action area is defined as all areas that may be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. It encompasses the geographic extent of environmental changes (i.e., the physical, chemical and biotic effects) that will result directly and indirectly from the action.

For the purposes of this BA, the Guam 'Action Area' includes several DoD and non-DoD parcels proposed for use: AAFB, Andersen South, Naval Base Guam, Tumon (Maui well rehabilitation), and Piti and Agana (DAR road projects).

Key sources of biological resources information include the Integrated Natural Resources Management Plan (INRMP) for Navy lands (COMNAV Marianas 2001b, 2008, and draft 2012); INRMPs for AAFB (Andersen AFB 2003, 2008a); Natural Resource Survey and Assessment Report (NAVFAC Pacific 2007a) and references therein; *Guam Comprehensive Wildlife Conservation Strategy* (Guam CWCS) (DAWR 2006); and previous EISs, EAs, BAs, and resulting USFWS BOs for recent actions on military lands in Guam. Site-specific natural resources geographic information system data were obtained from NAVFAC Pacific, NAVFAC Marianas, and AAFB.

3.2 Overview of the Vegetation Communities of Guam

The vegetation of Guam was initially described by Fosberg (1960). A comprehensive flora was published a decade later (Stone 1970), and an update to Fosberg (1960) was published in 1998 (Mueller-Dombois and Fosberg 1998). These authors demonstrated that the flora of Guam is unique, with 21% of its native vascular plants endemic to the Mariana Islands.

Donnegan et al. (2004) completed a forest inventory for Guam and they estimated that approximately 48 percent of the island was forested which consisted of 44,404 ac (17,970 ha) classified as limestone forest, with most found in northern Guam, and 19,129 ac (7,741 ha) classified as volcanic forest, with most found in southern Guam. Other vegetation or cover types included 44,455 ac (17,991 ha) of savanna and 23,956 ac (9,695 ha) of urban land.

Guam's vegetation types can be grouped into the following general plant communities: primary limestone forest (intact and never cleared), disturbed limestone forest (secondary, dominated by non-native species), halophytic/xerophytic scrub, scrub forest, tangantangan forest, strand, ravine forest, coconut groves, ironwood or Australian pine forest, savanna, wetlands, and developed (Fosberg 1960; Stone 1970; COMNAV Marianas 2001b; USFS 2006a).

Island-wide vegetation mapping was completed in 2005 by the U.S. Forest Service (USFS) (USFS 2006a), but the mapping had minimal ground-truthing and used only one category for

limestone forest, as opposed to the more commonly accepted method of describing limestone forest with multiple categories based on their degree of disturbance. The island-wide mapping lacks the necessary detail for an accurate description of the smaller parcels proposed for use under the Proposed Action.

In the site-specific subsections to follow, vegetation categories and mapping for each parcel are described and presented based on the best available published data for that parcel, with some modifications based on observations during site-specific field surveys conducted in support of the JGPO Military Relocation EIS/OEIS. The published sources are the INRMP for Guam Navy lands (COMNAV Marianas 2001b), basewide vegetation mapping for AAFB (Andersen AFB 2008c), and mapping by the USFS (2006a). Although the USFS effort is a more recent vegetation mapping that includes Navy installations, it is island-wide and at a grosser scale; the level of detail is greater in the INRMP, which more accurately captures the complexity of the vegetation mosaic at a parcel-specific scale.

As a means of introduction to the vegetation communities present on Guam, a general description of the vegetation categories is provided below based on descriptions by Fosberg (1960) and modified in the 2001 Navy INRMP (COMNAV Marianas 2001b), and with some additional modifications based on Stone (1970) and USFS (2006a). The vegetation types for recent mapping at AAFB (2008c) are correlated to these vegetation types at the end of each description when their designated names are different.

Limestone forest is a relatively undisturbed (never totally cleared) forest dominated by native species, sometimes called primary limestone forest to distinguish it from disturbed limestone forest (see next category). It is found on elevated limestone terraces, plateaus, and slopes and is present on AAFB and Naval Base Guam. Primary limestone plant communities are floristically diverse, containing both native and non-native woody plants, ferns, and herbaceous plants adapted to shallow and excessively drained shallow limestone soils. In its most undisturbed state, these plant communities characteristically have a stratified canopy consisting of scattered, large trees, native breadfruit, and fig with a maximum height of 60-70 ft (18-21 m). The limestone plant community is further broken down into five classes by Fosberg (1960): *Artocarpus-Ficus* forest, *Mammea* forest, *Cordia* forest, *Merrilliodendron-Ficus* forest, and *Pandanus* forest. Other dominate genera comprising both the upper canopy and mid-canopy layers include *Aglaia*, *Neisosperma*, *Premna*, *Tristiropsis*, *Elaeocarpus*, *Intsia*, *Pisonia*, and *Claoxylon*. Mid-canopy layers may be 30-45 ft (9-14 m) in height. Smaller specimens of the above species, as well as individuals of *Guamia mariannae* (pai pai), *Cycas circinalils* (= *micronesica*), Indian mulberry, and limeberry, are often present as a shorter understory layer.

Vegetation types at AAFB that are considered to correspond to primary limestone forest for the purposes of this analysis are: *Eugenia* forest, mixed limestone forest-plateau/primary, mixed limestone forest-toe slope/primary, and *Neisosperma* forest (only *Neisosperma* is mapped separately in this analysis).

The *disturbed limestone forest* sub-type of the limestone vegetation community is sometimes referred to as degraded limestone forest or secondary limestone forest. Disturbed limestone forests are dominated by woody species of relatively short stature (no canopy), or they have a canopy of non-native *Vitex*. The floristic composition represents subclimax seral stages following human induced disturbance, such as land clearing. The canopy of disturbed limestone forest is more open, allowing abundant solar energy to reach the forest floor. The majority of the woody biomass in the disturbed limestone forest is usually derived from non-native species, primarily tangantangan, limeberry, papaya, and others. Some areas of disturbed limestone forest are also dominated by larger non-native trees, such as African tulip tree. Vegetation types at AAFB that are considered to correspond to disturbed limestone forest for the purposes of this analysis are mixed limestone forest-plateau/secondary, *Hibiscus* scrub, mixed shrub, *Ochrosia* edge, *Vitex*-closed canopy, and *Vitex*-open canopy.

The *halophytic/xerophytic scrub* sub-type of the limestone vegetation community is a unique plant community that exists on limestone terraces and cliff edges. The presence of drying winds, exposure to salt spray, and excessively drained limestone soils result in a microclimate that supports a stunted, wind-pruned plant community. The floristic composition may either be simple or complex and comprised of a few or many species. Vegetation types at AAFB that are considered to correspond to halophytic/xerophytic scrub for the purposes of this analysis are: mixed limestone forest-foreslope, *Hibiscus-Ochrosia* scrub, and mixed limestone forest-toe slope.

Shrub/grasslands (scrub forest) are variable secondary thickets and partially cultivated scrub resulting from long-continued human disturbance, usually on argillaceous limestone. They may include small areas of coconut grove, bamboo clumps, patches of scrub or scrub forest, home sites, and small cultivated areas. The vegetation type at AAFB that is considered to correspond to shrub/grasslands for the purposes of this analysis is mixed herbaceous scrub.

The *tangantangan* community typically occurs on limestone and is dominated by the introduced small tree, tangantangan. The vegetation type at AAFB that is considered to correspond to tangantangan for the purposes of this analysis is *Hibiscus-Leucaena*.

Strand plant communities are limited to narrow strips in coastal areas within Naval Base Guam. Strand vegetation is adapted to excessively drained soils and salt spray from the adjacent coastal waters. Many of the beach areas are occasionally inundated with salt water during storm events, which imposes a controlling influence on all biota. Vegetation types at AAFB that are considered to correspond to strand for the purposes of this analysis are: back strand/rock, back strand/sand, fore strand/sand, and strand/rock.

Coconut groves are planted communities that are inclusive within limestone, ravine, and strand communities.

Casuarina forest, also known as ironwood or Australian pine forest, tolerates dry and salty conditions, and often occurs as a savanna habitat. In some locations, it forms a sparse woodland

with little understory. Ironwood also occurs in exposed areas and in narrow bands at some locations along the coast.

Wetlands are habitats that are subject to permanent or periodic inundation or prolonged soil saturation, including marshes, swamps, and similar areas. Areas described and mapped as wetland communities may include small streams, shallow ponds, and pond or lake edges. The recurrent excess of water in wetlands imposes controlling influences on all biota (plants, animals, and microbes). Stone (1970) referred to Fosberg's (1960) wetlands as marshes. Fosberg (1960) described seven subtypes of the wetland plant communities based on their dominant floristic composition. He defined swamps as supporting plant communities with a predominance of woody species (designated as ravine communities for the purpose of this vegetation classification), and marshes as supporting herbaceous plant communities. *Mangroves* are coastal wetland areas dominated by any of the following mangrove species: *Rhizophora* spp., *Bruguiera gymnorrhiza*, *Avicennia marina*, *Lumnitzera littorea*, *Xylocarpus moluccensis*, or *Nypa fruticans*.

Marshes are generally located in low places along the coast, along streams, in depressions and sinkholes with argillaceous limestones, or in poorly drained areas with volcanic soils. Marshes may be inundated with fresh water, or brackish water if near the ocean. Swamps are generally located along rivers, especially near the coast, or near sea level (along river valleys if inland), and are usually designated as ravine communities rather than wetland communities. Most marshes are floristically simple, with only a few plant species being dominant. The most common marsh species, *Phragmites karka*, a tall reedy perennial grass, often forms a dense monocultural plant community. *Scirpus littoralis*, a perennial bulrush that grows from rhizomes, also forms dense stands along stream banks and in estuaries. The large golden leatherfern can also dominate some marshes. Other floristic components of wetland plant communities can include sedge (*Cyperus* spp.), *Paspalum vaginatum*, and para grass.

Developed land (urban/alien) are human-occupied or otherwise highly disturbed areas that include lawns and other landscaped areas and impervious surfaces such as buildings, roads, and parking lots.

Badland/barren lands are areas of exposed soils caused by erosion and with little or no vegetation.

The following sections provide a more detailed discussion of the vegetation communities found within each parcel proposed for use under the Proposed Action.

Andersen AFB

Andersen AFB is located in a limestone geologic region which generally consists of limestone plateaus with abrupt cliffs that drop off toward the ocean. The underlying limestone may be strongly weathered into a karst formation. Terrestrial vegetation communities at AAFB have been recently mapped and described in detail (Andersen AFB 2008c). Vegetation was mapped using the basic vegetation types of Fosberg (1960) but with modifications and expanded

categories to fit more recent mapping efforts in Guam and on AAFB. The basic vegetation communities include limestone forest, secondary limestone forest, coastal strand vegetation, mixed shrub, mixed herbaceous scrub, communities dominated by one or two species, and disturbed areas (Figure 3-1). Acreages of each vegetation community on AAFB are listed in Table 3-1.

Table 3-1. Vegetation Communities at Andersen AFB

Vegetation Type	*Ac (ha)*
Casuarina Forest	102 (41)
Coconut grove	487 (197)
Developed Land	4,501 (1,821)
Halophytic-Xerophytic Scrub	1458 (589)
Limestone Forest – Disturbed	6,266 (2,535)
Limestone Forest – Primary	2,008 (813)
Shrub/Grassland	732 (296)
Strand	186 (75)
Tangantangan	109 (44)
Total	15,849 (6,411)

In East AAFB, the North Ramp project area (proposed ACE) consists primarily of developed land, but there are small areas of mixed herbaceous scrub and mixed limestone forest in the northern portion of the site. The South Ramp project area (proposed AMC/Air Embarkation) consists primarily of developed land, but there are small areas of *Ochrosia* edge and mixed herbaceous scrub habitats in the eastern portion of the site. The North Gate project area consists of mixed limestone forest, *Vitex*-dominated forest, and developed land.

In West AAFB and NWF, and surrounding areas consist primarily of mixed limestone forest, *Vitex*-dominated forest, mixed herbaceous scrub, mixed shrub, *Casuarina* forest, and developed land.

Naval Base Guam

Acreages are listed in Table 3-2 while Figure 3-2 depicts the cover types within the boundaries of Naval Base Guam as mapped in the 2001 Navy INRMP (COMNAV Marianas 2001b).

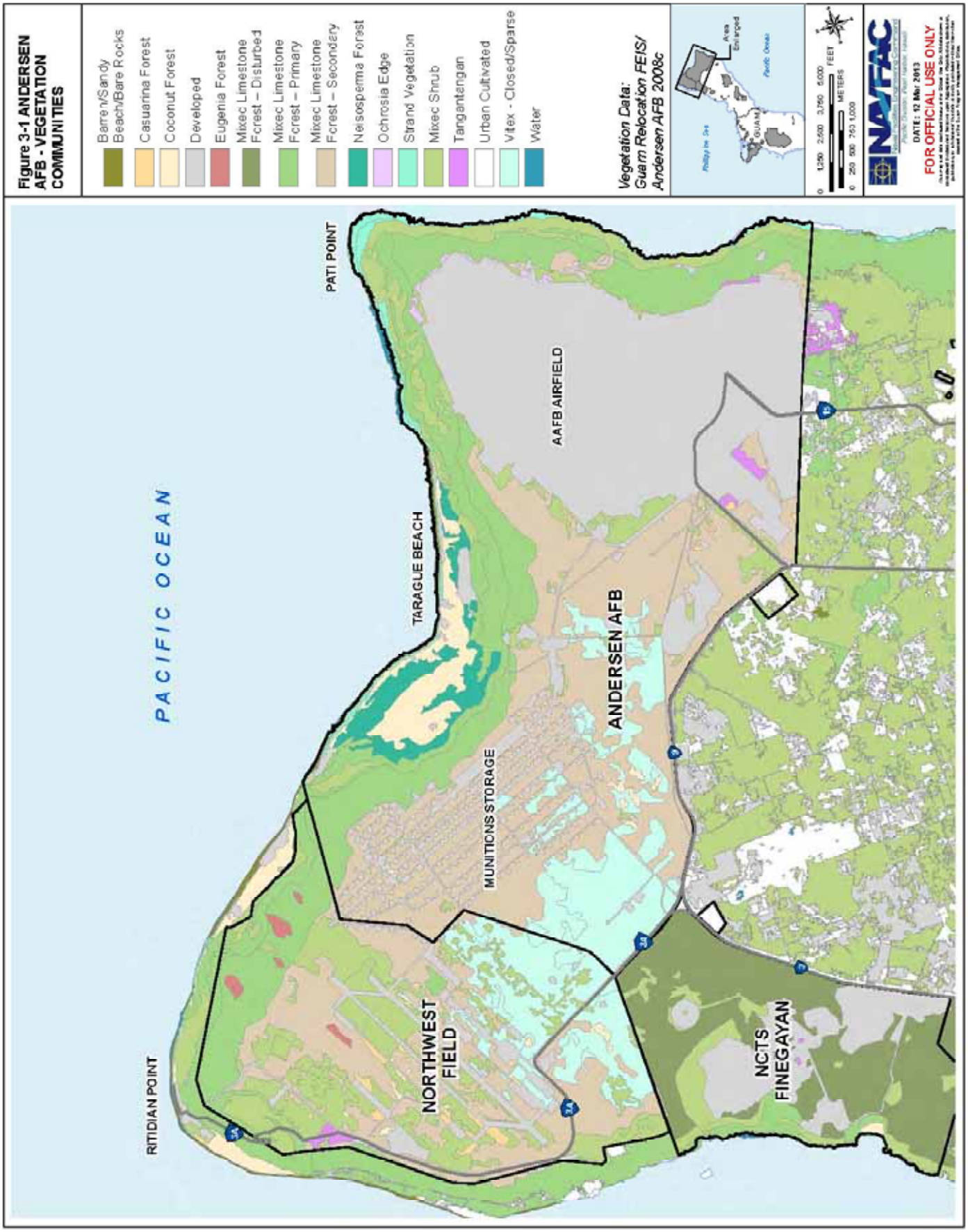
Figure 3-1 ANDERSEN AFB - VEGETATION COMMUNITIES
Barren/Sandy Beach/Bare Rocks
Casuarina Forest
Coconut Forest
Developed
Eugenia Forest
Mixec Limestone Fcrest – Disturbed
Mixec Limestone Fcrest – Primary
Mixec Limestone Fcrest – Secondary
Neisosperma Forest
Ochrosia Edge
Strand Vegetation
Mixec Shrub
Tangantengan
Urban Cultivated
Vitex - Closed/Sparse
Water
Vegetation Data: Guam Relocation FEIS/ Andersen AFB 2008c
Area Enlarged
Philippine Sea
GUAM
Pacific Ocean
0 1,250 2,500 3,750 5,000 FEET
0 250 500 750 1,000 METERS
NAVFAC
DATE: 12 Mar 2013
FOR OFFICIAL USE ONLY
PACIFIC OCEAN
PATI POINT
TARAGUE BEACH
AAFB AIRFIELD
ANDERSEN AFB
MUNITIONS STORAGE
RITIDIAN POINT
NORTHWEST FIELD
NCTS FINEGAYAN

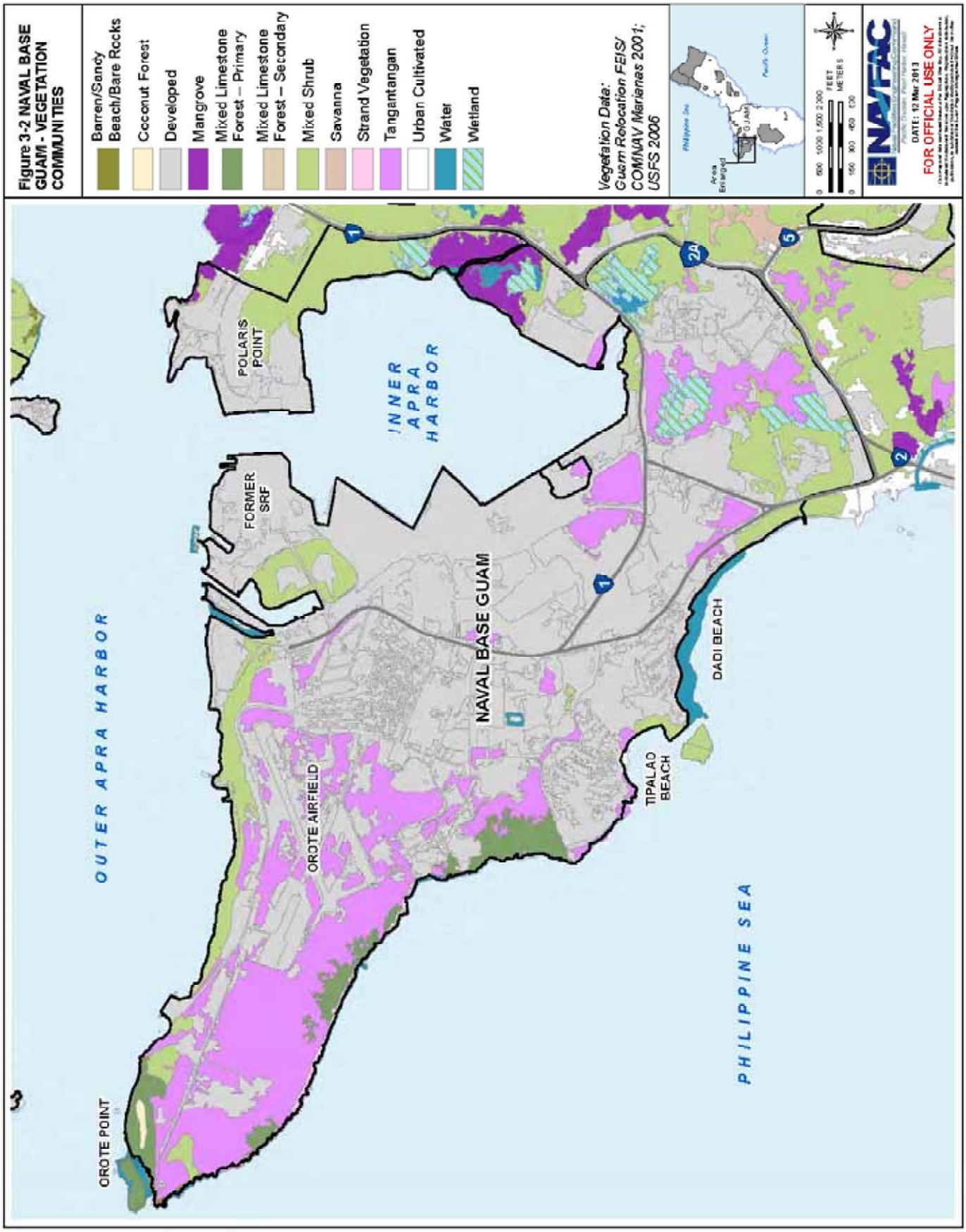
Figure 3-2 NAVAL BASE GUAM - VEGETATION COMMUNITIES
Barren/Sandy Beach/Bare Rocks
Coconut Forest
Developed
Mangrove
Mixed Limestone Forest – Primary
Mixed Limestone Forest – Secondary
Mixed Shrub
Savanna
Strand Vegetation
Tangantangan
Urban Cultivated
Water
Wetland
Vegetation Data: Guam Relocation FEIS/ COMNAV Marianas 2001; USFS 2006
Philippine Sea
Pacific Ocean
GUAM
Area Enlarged
FEET
METERS
NAVFAC
DATE: 12 Mar 2013
FOR OFFICIAL USE ONLY
OUTER APRA HARBOR
INNER APRA HARBOR
POLARIS POINT
FORMER SRF
NAVAL BASE GUAM
OROTE AIRFIELD
OROTE POINT
TIPALAO BEACH
DADI BEACH
PHILIPPINE SEA

Table 3-2. Vegetation Communities at Naval Base Guam

Vegetation Type	*Ac (ha)*
Badland/barren	2.1 (0.8)
Coconut grove	3.8 (1.5)
Developed	2,106 (852)
Limestone forest - Primary	86 (35)
Shrub/Grassland	353 (143)
Strand	12 (4.9)
Tangantangan	620 (251)
Wetlands (mangrove)	53 (21)
Wetlands	3.8 (1.5)
Total	3,240 (1,311)

Much of the terrestrial area of Naval Base Guam is vegetated with communities that have undergone previous disturbance (e.g., disturbed limestone forest, disturbed ravine forest, and developed land). Limestone communities are limited to the cliff area on Orote Peninsula. A narrow band of halophytic/xerophytic scrub communities exists on cliff faces on Orote Peninsula. Ravine forests are restricted to narrow strips along the few freshwater rivers near the coast. Savannas are limited to the eastern portions of the Waterfront Annex (COMNAV Marianas 2001b).

Mangroves are present along the east side of Apra Harbor. These mangroves and associated wetlands include the following plant species: *Rhizophora mucronata*, *Bruguiera gymnorhiza*, *Avicennia* spp., *Xylocarpus moluccensis*, *Lumnitzera coccinea*, *Heritiera littoralis*, *Hibiscus tiliaceus*, and *Acrostichum aureum* (COMNAV Marianas 2001b).

None of the proposed project areas at Naval Base Guam fall within limestone forest, ravine forest, or mangrove areas. Most are located in maintained and previously developed areas.

Tumon Maui

Acreages are listed in Table 3-3 while Figure 3-3 depicts the cover types within the boundaries of Tumon Maui.

The acreage impacts are less than one acre with the majority occurring within urban cultivated or developed vegetation communities. None of the proposed project areas fall within limestone forest, ravine forest, or mangrove areas. Most are located in maintained and previously developed areas.

Table 3-3. Vegetation Communities at Tumon Maui

Vegetation Type	*Ac (ha)*
Developed	.05 (0.02)
Shrub/Grassland	0.38 (0.15)
Urban Cultivated	0.34 (0.13)
Total	0.77 (.31)

DAR Roads

Acreages are listed in Table 3-4 while Figure 3-4 depicts the cover types within the boundaries of the DAR Roads.

The vegetation acreage impacts are predominantly developed (43.7 acres). None of the DAR road projects fall within limestone forest, ravine forest, or mangrove areas.

Table 3-4. Vegetation Communities at the DAR Roads

Vegetation Type	*Ac (ha)*
Developed	43.7 (17.6)
Shrub/Grassland	6.46 (2.6)
Tangantangan	0.95 (0.38)
Urban Cultivated	6.39 (2.5)
Other - Water	1.22 (0.49)
Total	58.72 (23.7)

Anderson South

Figure 3-15 depicts the cover types within the boundaries of Andersen South based on USFS (2006a) mapping, and acreages are provided in Table 3-6. The vegetation communities within Andersen South indicate significant previous disturbance.

The vegetation acreage impacts are predominantly mixed limestone forest (disturbed) (43.7 acres). None of the DAR road projects fall within limestone forest, ravine forest, or mangrove areas.

Table 3-5. Vegetation Communities at the Andersen South Non-Live Fire Training Area

Vegetation Type	*Ac (ha)*
Developed	39.78 (16.0)
Limestone Forest – Disturbed	62.71 (25.3)
Shrub/Grassland	18.99 (7.6)
Tangantangan	1.68 (0.68)
Total	123.2 (49.8)

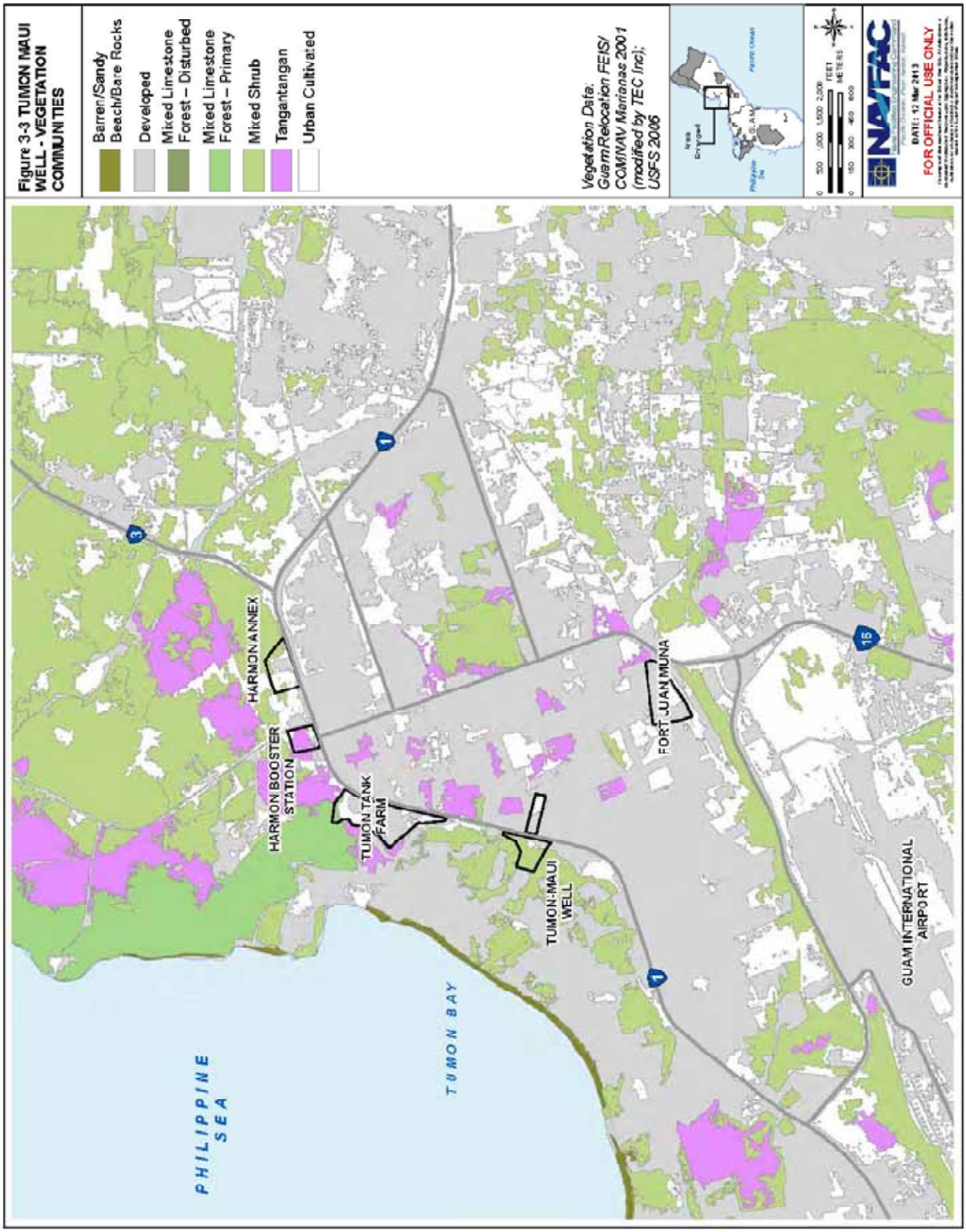
Figure 3-3 TUMON MAUI WELL - VEGETATION COMMUNITIES
Barren/Sandy Beach/Bare Rocks
Developed
Mixed Limestone Forest – Disturbed
Mixed Limestone Forest – Primary
Mixed Shrub
Tangantangan
Urban Cultivated
Vegetation Data: Guam Relocation FEIS/ COMNAV Marianas 2001 (modified by TEC Inc); USFS 2006
Area Enlarged
GUAM
Philippine Sea
Pacific Ocean
0 500 1,000 1,500 2,000 FEET
0 150 300 450 600 METERS
NAVFAC
DATE: 12 Mar 2013
FOR OFFICIAL USE ONLY
HARMON ANNEX
HARMON BOOSTER STATION
TUMON TANK FARM
TUMON-MAUI WELL
FORT SANTA MUNA
GUAM INTERNATIONAL AIRPORT
PHILIPPINE SEA
TUMON BAY
3
1
16

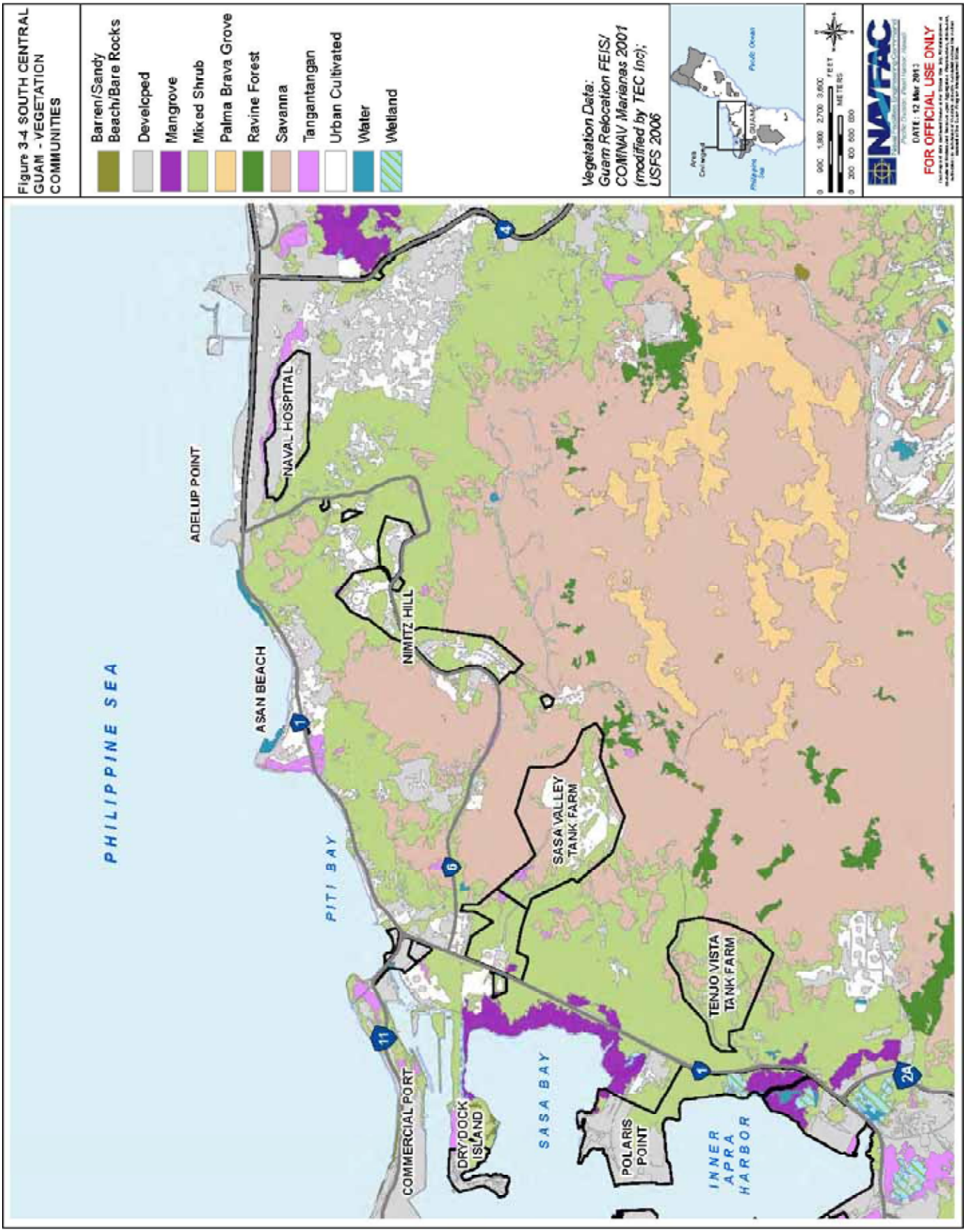
Figure 3-4 SOUTH CENTRAL GUAM - VEGETATION COMMUNITIES
Barren/Sandy Beach/Bare Rocks
Developed
Mangrove
Mixed Shrub
Palma Brava Grove
Ravine Forest
Savanna
Tangantangan
Urban Cultivated
Water
Wetland
Vegetation Data: Guam Relocation FEIS/ COM/NAV Marianas 2001 (modified by TEC Inc); USFS 2006
Area Enlarged
GUAM
Philippine Sea
Pacific Ocean
0 900 1,800 2,700 3,600 FEET
0 200 400 600 800 METERS
NAVFAC
Pacific Division - Pearl Harbor, Hawaii
DATE: 12 Mar 2013
FOR OFFICIAL USE ONLY
PHILIPPINE SEA
ADELUP POINT
NAVAL HOSPITAL
NIMITZ HILL
ASAN BEACH
PITI BAY
SASA VALLEY TANK FARM
TENJO VISTA TANK FARM
COMMERCIAL PORT
DRY DOCK ISLAND
SASA BAY
POLARIS POINT
INNER APRA HARBOR
1
4
6
11
2A

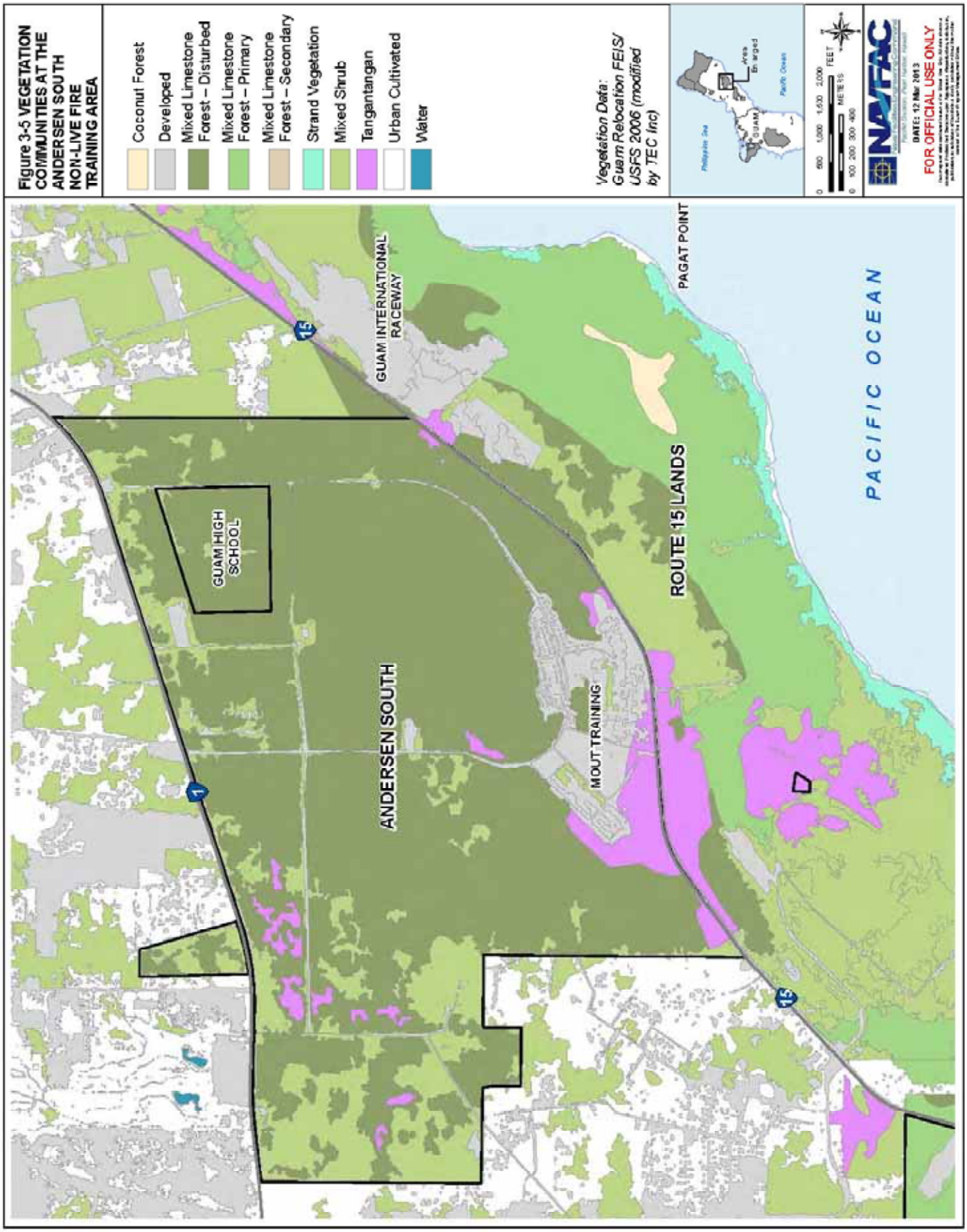
Figure 3-5 VEGETATION COMMUNITIES AT THE ANDERSEN SOUTH NON-LIVE FIRE TRAINING AREA
Coconut Forest
Developed
Mixed Limestone Forest – Disturbed
Mixed Limestone Forest – Primary
Mixed Limestone Forest – Secondary
Strand Vegetation
Mixed Shrub
Tangantangan
Urban Cultivated
Water
Vegetation Data: Guam Relocation FEIS/ USFS 2006 (modified by TEC Inc)
Philippine Sea
Pacific Ocean
GUAM
Area Enlarged
0 100 200 300 400 METERS
0 500 1,000 1,500 2,000 FEET
NAVFAC
DATE: 12 Mar 2013
FOR OFFICIAL USE ONLY
GUAM INTERNATIONAL RACEWAY
PAGAT POINT
PACIFIC OCEAN
GUAM HIGH SCHOOL
ROUTE 15 LANDS
ANDERSEN SOUTH
MOUT TRAINING
1
15

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CHAPTER 4
DESCRIPTION OF LISTED SPECIES THAT MAY BE AFFECTED

4.1 INTRODUCTION

This BA addresses the potential effects associated with the proposed Marine Corps actions on one federally listed species (refer to Section 1.3.1 and Table 1-1). Section 7 of the ESA requires consultation on federally listed endangered and threatened species, species proposed for listing, designated critical habitat, and proposed critical habitat that may be affected by the Proposed Action.

4.2 MARIANA FRUIT BAT

4.2.1 Species Description

The Mariana fruit bat or flying fox, known as fanihi in Chamorro, is a medium-sized fruit bat that weighs 11.6-20.3 ounces (oz) (330-577 grams [g]) and a wingspan of 34-42 in (860-1,065 mm), with males slightly larger than females. The underside is black to brown with interspersed gray hair creating a grizzled appearance. The shoulders and sides of the neck are bright golden brown, but may be paler in some individuals. The head varies from brown to dark brown (Andersen AFB 2008b: 1-4 and 1-8).

Listing Status

The Guam population of the Mariana fruit bat was listed as endangered in August 1984 (USFWS 1984). It was listed as a subspecies found only on Guam. However, in 2005, the U.S. Fish and Wildlife Service reclassified the Mariana fruit bat from endangered to threatened status. The reclassification was based on research indicating *Pteropus mariannus mariannus* is not a subspecies endemic only to Guam but the Guam population is part of a subspecies including bats on other islands that interact with each other (USFWS 2005). In October 2004, approximately 376 ac (152 ha) of USFWS lands were designated as critical habitat for the fruit bat within the Ritidian Unit of the Guam NWR (USFWS 2004a) (Figure 4-1).

Threats

The primary threats to the Mariana fruit bat throughout its range are illegal hunting, and habitat destruction both by volcanic eruptions and man-made disturbances. Illegal hunting and predation from BTS are widely accepted as reasons for lack of fruit bat recovery on Guam (USFWS 2005c). Consumer demand remains the driving force for illegal hunting and has prevented the recovery of fruit bats in the southern CNMI (Brooke 2008: 2).

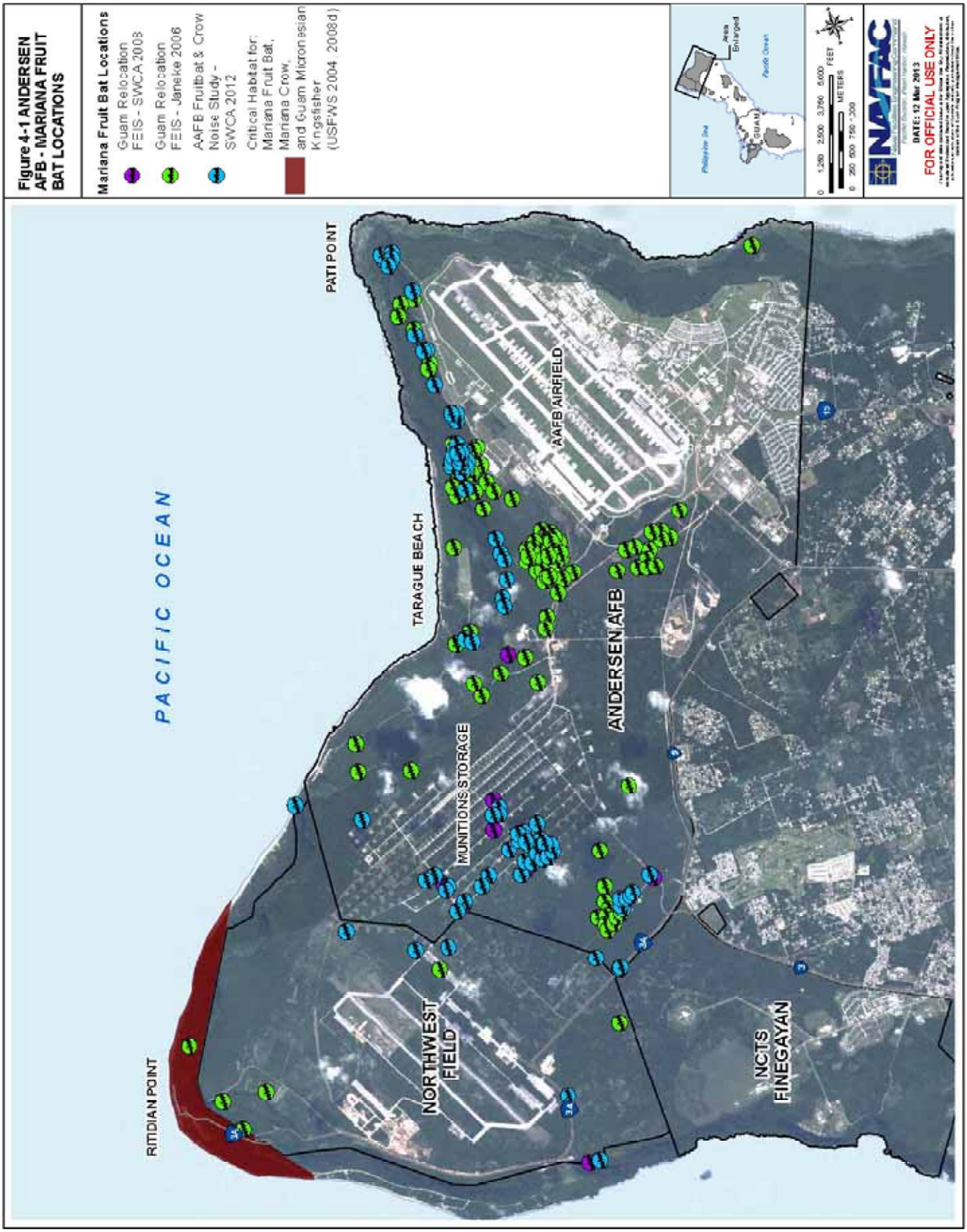
Figure 4-1 ANDERSEN AFB - MARIANA FRUIT BAT LOCATIONS
Mariana Fruit Bat Locations
Guam Relocation FEIS - SWCA 2008
Guam Relocation FEIS - Janeke 2006
AAFB Fruitbat & Crow Noise Study - SWCA 2012
Critical Habitat for: Mariana Fruit Bat, Mariana Crow, and Guam Micronesian Kingsfisher (USFWS 2004, 2008d)
Philippine Sea
Pacific Ocean
GUAM
Area Enlarged
0 1,250 2,500 3,750 5,000 FEET
0 250 500 750 1,000 METERS
NAVFAC
DATE: 12 Mar 2013
FOR OFFICIAL USE ONLY
PACIFIC OCEAN
PATI POINT
TARAGUE BEACH
AAFB AIRFIELD
ANDERSEN AFB
MUNITIONS STORAGE
NORTHWEST FIELD
NCTS FINEGAYAN
RITIDIAN POINT

Ecology

The Mariana fruit bat forages and roosts in native limestone forest and occasionally in coconut groves and strand vegetation (Perez 1972, Wheeler 1979, USFWS 1990b). The bats roost in strangler fig, *M. odorata*, and *N. oppositifolia*, but have been known to roost in *Macaranga thompsonii* (pengua in Chamorro) and *G. speciosa* (Wiles 1987a). This species feeds on a variety of plant material but fruit makes up the majority of its diet (frugivorous) (Wiles 1987a, USFWS 1990b).

Colonial roost sites are an important aspect of the Mariana fruit bat's biology because they are used for social aggregations, roosting, sleeping, grooming, breeding, and intra-specific interactions. Published reports of roost sites on Guam indicate these sites occur in mature limestone forest and are found within 328 ft (100 m) of 262 to 591-ft (80 to 180-m) tall clifflines. Native forest habitat is also an important aspect of fruit bat biology as it is also used for roosting, feeding, etc by non-colonial bats. On Guam, Mariana fruit bats are known to roost or use mature *Ficus* spp. and *Mammea odorata* trees but will also roost in other tree species such as *Casuarina equisetifolia*, *Macaranga thompsonii*, *Guettarda speciosa*, and *Neisosperma oppositifolia*. Factors involved in roost site selection are not clear, but data from Guam indicate that some sites may be selected for their inaccessibility by humans and thus limited human disturbance.

Bats depart their roost sites to forage for fruit and other native and non-native plant materials such as leaves and nectar. Mariana fruit bats forage on the fruit of at least 28 plant species, the flowers of 15 species, and the leaves of two plant species. Some plants used for foraging include *Artocarpus* spp., *Carica papaya*, *Cycas micronesica*, *Ficus* spp., *Pandanus tectorius*, *Cocos nucifera*, and *Terminalia catappa.* Many of these plant species are found in a variety of forested habitats on Guam, including limestone, ravine, coastal, and secondary forests (USFWS 2006b: 20).

Historical and Current Distribution

Pteropus mariannus mariannus is endemic to the Mariana archipelago, where it is found on most of the 15 major islands. There are no records of fruit bats on Uracas, and fruit bats have been observed at two different times on FDM (Draft JRM INRMP 2013). Research indicates that the Mariana fruit bat occasionally moves from one island to another in the Mariana archipelago (Perez 1972, Wiles 1987b, Wiles and Glass 1990).

Status of Species within the Action Area

On Guam, the sighting of fanihi was considered to be "not... uncommon" in 1920 (Crampton 1921 in USFWS 2009b). However, by 1931, bats were uncommon on Guam, possibly because the introduction of firearms led to more hunting (Coultas 1931). In 1958, the Guam population was estimated to number no more than 3,000. This estimate had dropped to between 200 and 750 animals by 1995. Over the past several decades, the population of fruit bats on Guam has continued to decline and the island-wide population is likely to be less than 50 bats (USFWS

2006b: 18; Brooke 2008: 1). Other than a few isolated periods of increase, fruit bats have been in long-term decline on Guam (USFWS 2009b), in response to a combination of threats.

Andersen AFB. On AAFB, individual bats and small groups have been observed roosting in both primary (mature and native-dominated) and secondary growth limestone forest cover (Janeke 2006). The majority of the bats roost at a single site on Pati Point on AAFB, and an unknown number of solitary bats utilize the limestone and secondary forests of Guam. Fruit bats forage over the forests and coastal areas, and are occasionally sighted at Tarague Beach (Andersen AFB 2008a, b, d). Figure 4-1 depicts the areas of occurrence of fruit bats on AAFB based on past studies and monitoring programs.

At the Pati Point colony, there have been less than 100 bats observed at any time at the colony site. This colony has undergone dramatic short-term fluctuations in the past indicating that members of the colony may be able to migrate easily between Rota and Guam (COMNAV Marianas 2001b). Surveys conducted from June 2007 through April 2008 recorded 31-54 individuals with an average of 40 (Andersen AFB 2008d).

In the ISR Strike Biological Opinion the USFWS stated they expected that noise effects would adversely affect the Mariana fruit bat to the extent that the nearby Pati Point colony would be abandoned by the 21 bats estimated to remain there in 2006. The USFWS determined that fruit bats relocating from Pati Point to other, less-protected areas on the island likely would be shot opportunistically by hunters (USFWS 2006, p. 49). In the ISR Strike Biological Opinion, USFWS concluded that the remaining fruit bats on Guam would be taken as a result of the proposed action, but that this take would not jeopardize the continued overall existence of the Mariana fruit bat (USFWS 2006, pp. 49–52).

Fifty-three survey counts at Pati Point colony site from 24 December 2010 to November 2011 had an average of 2.2 bats. Counts of solitary bats throughout the forest of AAFB did not locate other colonial roost sites. Extensive surveys conducted throughout AAFB between December 2010 and December 2011 resulted in a conservative estimate of approximately 25 fruit bats (SWCA 2012). As of 2011, no new fruit bat colonies have been recorded anywhere on Guam (GDAWR 2011 and SWCA 2012). Tarague Basin is a major conduit for Mariana fruit bat travel between the main Pati Point colony and foraging areas at NWF, Ritidian Point, and portions of the Main Base. Recent surveys of the number of fruit bats at the Pati Point colony have indicated very low (less than 5 bats in 2011 [SWCA 2012]) attendance, indicating this colony site is no longer being used.

Naval Base Guam. The Mariana fruit bat is rarely observed at Naval Base Guam. One bat was sighted on NBG lands in 2008 during 90 hours of fruit bat surveys at 14 survey locations on or near NBG lands. It is likely that a small number of solitary-roosting fruit bats (> 10) also occur on NBG lands but were not observed. Solitary individuals can move to and from areas during the year.

Site assessments of the Working Dog Relocation and Apra Harbor Wharf Improvements projects were conducted on September 17, 2012 in support of the projects, however, due to the degree of development, industrial activity, and lack of sufficient suitable habitat and lack of recent documented sightings, surveys were not conducted for Mariana fruit bat.

Andersen South. Bat surveys were conducted March 18-20, 2013 by Ms. Jennifer Farley and Mr. Scott Vogt (Vogt and Farley 2013). No bats were detected during these surveys and no bats are known to historically utilize the area.

Tumon. A site assessment of the area was conducted on September 17, 2012, however, due to the degree of development, industrial activity, and lack of sufficient suitable habitat and lack of recent documented sightings, surveys were not conducted for Mariana fruit bat.

Piti. A site assessment of the area was conducted on September 17, 2012, however, due to the degree of development, industrial activity, and lack of sufficient suitable habitat and lack of recent documented sightings, surveys were not conducted for Mariana fruit bat.

CHAPTER 5
ANALYSIS OF POTENTIAL EFFECTS TO FEDERALLY LISTED SPECIES

5.1 APPROACH TO ANALYSIS

This chapter presents an analysis of potential direct and indirect effects on a federally listed species from implementation of the Proposed Action. Potential activities that may affect federally listed species include construction and operation of facilities. Direct effects are the direct or immediate effects of the project on the species or its habitat. Direct effects result from the Proposed Action including the effects of interrelated actions and interdependent actions. Indirect effects are those that are caused by the Proposed Action and are later in time, but still are reasonably certain to occur (e.g., attraction of predators due to development and human presence). All direct and indirect project effects on listed species have been further classified and evaluated based on their anticipated longevity (i.e., temporary or permanent effects). Effects of the action under consultation are analyzed together with the effects of other activities that are interrelated to, and interdependent of, that action. Interrelated actions are those that are part of a larger action and depend on the larger action for its justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

As they relate to the federally listed species considered in this BA, direct and indirect effects from proposed activities within the action areas have been evaluated herein based upon: (1) an understanding of the methods and equipment that would be used during construction and operation of facilities, (2) knowledge of the potential for such methods and equipment to disturb the natural resources on which the subject species depend, and (3) awareness of the types of effects that have resulted from similar actions in the past.

Stressors of the Proposed Action

Stressors associated with proposed construction and operation of facilities associated with the Proposed Action were identified based on previous consultations, particularly the formal consultation process for the MIRC EIS/OEIS and the JGPO FEIS and resulting Biological Opinions.

5.2 Potential Effects to the Mariana Fruit Bat

Habitat

The USFWS has identified approximately 29,308 ac (11,860 ha) of habitat on Guam suitable for the Mariana fruit bat (USFWS 2010). Based on the assumed vegetation disturbance under the Proposed Action and the habitat requirements of the Mariana fruit bat (i.e., limestone forest, *Vitex* forest, and tangantangan), approximately 163.26 acres of potential foraging and roosting habitat would be directly impacted due to the construction of the Utilities and Site

Improvements, Phase I: Apra Harbor (46.68 ac), North Ramp Utilities (109.2 ac), North Ramp Parking (5.27 ac), Apra Harbor Wharf Improvements (0.96 ac), Defense Access Roads (0.95 ac), Air Mobility Campus Terminal (0.16 ac), and Tumon Maui Well Project (0.04 ac) (Table 5-1 and Figures 5-1 through 5-6). The vegetation disturbance associated with the Proposed Action is equivalent to less than 0.6% of the total habitat available on Guam.

The DON has and will continue to conduct preconstruction surveys to ensure no bats are occupying the vegetation to be removed. This conservation measure coupled with (1) small percentage of vegetation disturbance, (2) few to no bats within the Proposed Action areas (less than 5 bats at AAFB; no bats at NBG), and the (3) insufficient information to quantify the relationship between a sustainable population size and the aerial extent of habitat suitable for breeding, roosting, and foraging (USFWS 2010) support our assessment that the effects of the Proposed Action are insignificant due to the fact that the size of the impact should never reach the scale where take occurs.

Table 5-1. Vegetation impacts related to the Revised Proposed Actions

Project Number	Limestone Forest, Primary	Limestone Forest, Disturbed	Ravine Forest	Scrub / Scrub Forest	Vitex Closed/Sparse Canopy	Savanna	Shrub/ Grassland	Tangantangan	Developed
J-001 - Andersen AFB, Apra Harbor	0.37	26.07	0.00	4.74	19.75	0.00	0.00	0.49	73.51
P-100	2.57	103.57	0.00	38.32	0.06	0.00	0.00	3.00	166.91
P-101	4.99	0.28	0.00	5.20	0.00	0.00	0.00	0.00	145.95
P-204	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.96	71.47
P-1003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.94
P-1006	0.00	0.00	0.00	6.46	0.00	0.00	0.00	0.95	21.98
P-3202 (AMC Term.)	0.00	0.16	0.00	0.63	0.00	0.00	0.00	0.00	10.68
Tumon Maui Well Prj.	0.00	0.00	0.00	5.28	0.00	0.00	0.00	0.04	0.51
TOTALS	**7.93**	**130.08**	**0.00**	**60.63**	**19.82**	**0.00**	**0.00**	**5.44**	**496.94**

Noise

No direct impacts to the Mariana fruit bat are anticipated as a result of noise related impacts associated with the Proposed Action because no increase in the noise environment is anticipated.

Construction projects at AAFB will be temporary and localized within existing noise contours that range from 60 to 85 decibel (dB) day-night average sound level.[1]

Construction noise is generated by the use of heavy equipment on job sites and is short-term in duration (i.e., the duration of the construction period). Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. For a single point source, like a construction bulldozer, the sound level decreases by approximately 6 dBs for each doubling of distance from the source. Sound that originates from a linear, or 'line' source, such as a passing aircraft, attenuates by about 3 dBs for each doubling of distance where no other features such as vegetation, topography, or walls absorb or deflect the sound. Depending upon their nature, the ability of such features to reduce noise levels may range from minimally to substantially.

Construction noise typically confined within an installation boundary, occurs during daylight hours, and is only present during the period of construction.

The DON has and will continue to conduct construction operations during the daylight hours. Construction during the daylight hours in addition to the small percentage of vegetation disturbance and the fact that there are few to no bats within the Proposed Action areas (less than 5 bats at AAFB; no bats at NBG), support our assessment that the effects of noise extremely unlikely to occur.

Lighting

No direct impacts to the Mariana fruit bat are anticipated as a result of construction related light impacts because none of the construction projects which have the potential to affect the Mariana fruit bat will use night-time lighting.

For the minimization of potential impacts to fruit bats related to facility operations, lighting will be designed to meet minimum safety, anti-terrorism, and force protection requirements.

To the maximum extent practical, hooded lights will be used at all new roads and facilities proposed for construction and use within sea turtle land-based habitat and Mariana fruit bat habitat.

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[1] The day-night average sound level (DNL) is the A-weighted equivalent sound level for a 24 hour period with an additional 10 dB imposed on the equivalent sound levels for night time hours of 10 p.m. to 7 am. The noise between the hours of 10 p.m. and 7 a.m. is artificially increased by 10 dB. This noise is weighted to take into account the decrease in community background noise of 10dB during this period.

Lighting associated with the Andersen South will be installed at parking and administrative facilities (DON 2010a, p. 44).

5.3 Effects Determination to Mariana Fruit Bat

Based on the potential direct and indirect effects on the Mariana fruit bat and its potential habitat due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **may affect, but is not likely to adversely affect** the Mariana fruit bat. This determination is consistent with the previous Biological Opinion. The previous Biological Opinion (USFWS 2010) concluded the Proposed Action was "likely to adversely affect the Mariana fruit bat on Guam." The previous conclusion was based on the USFWS anticipating that up to ten remaining Mariana fruit bats at the Pati Point natural area colony will be taken in the form of harassment due to loud aircraft noise resulting from the Proposed Action. Loud aircraft noise is not part of the revised Proposed Action.

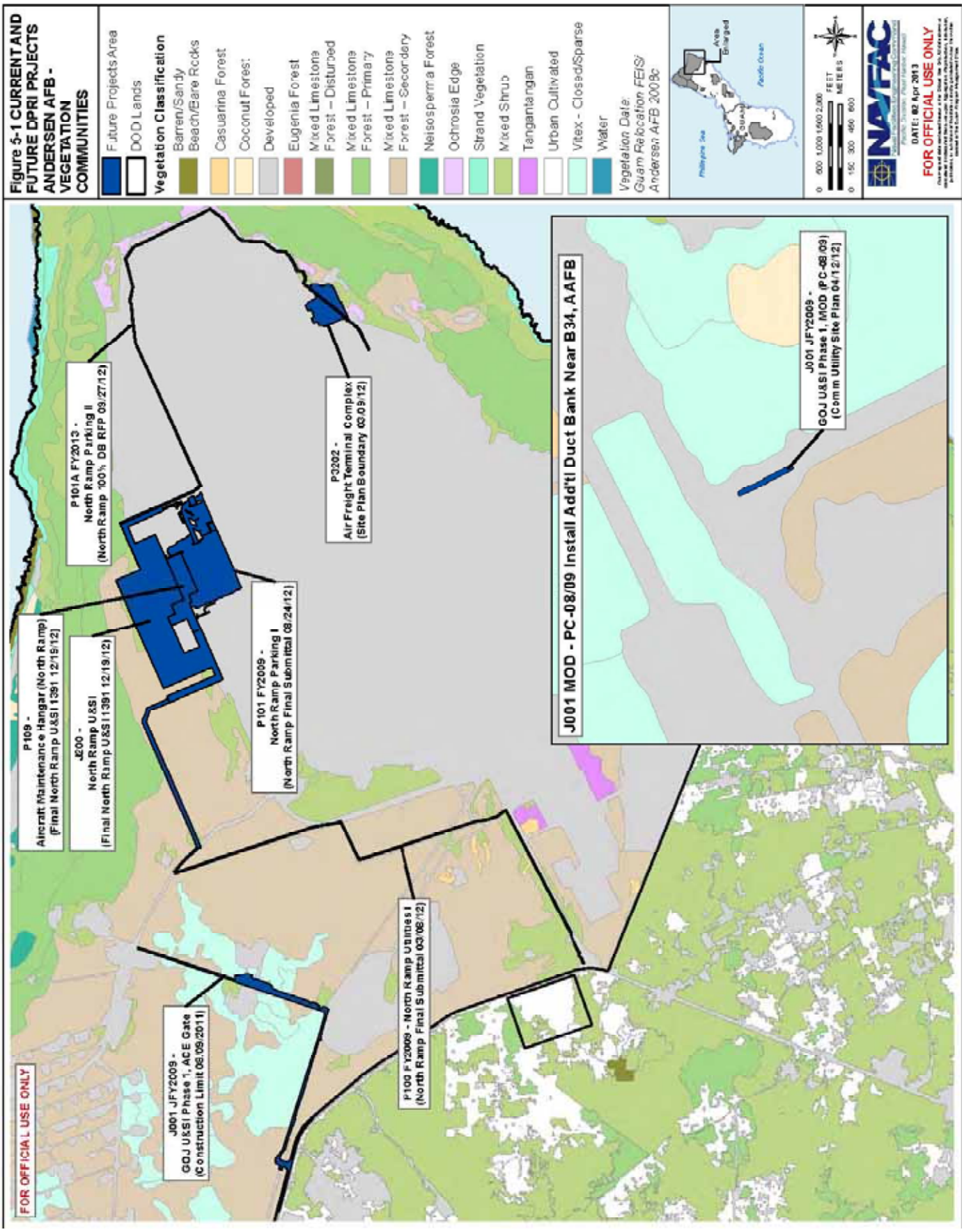
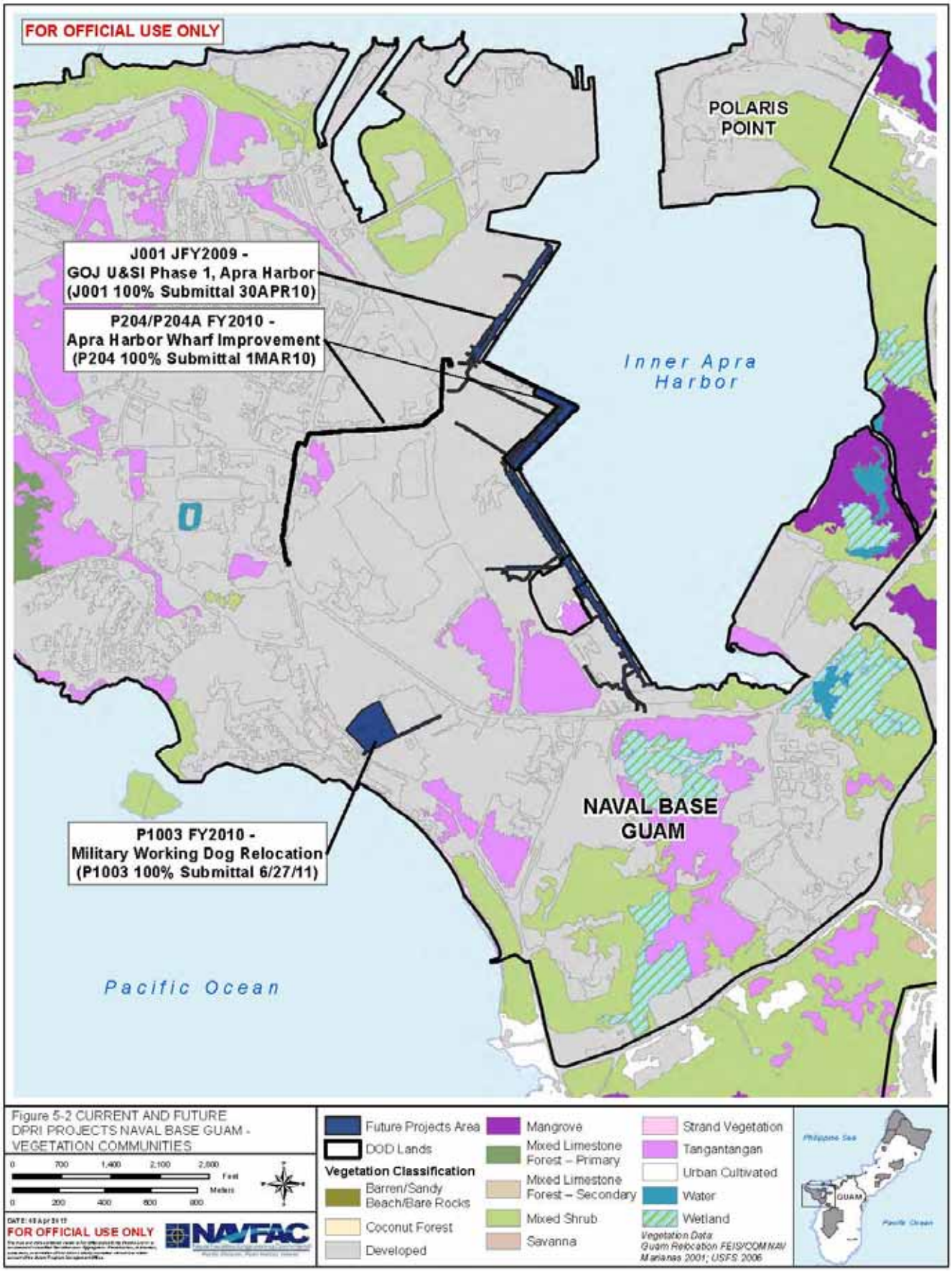


Figure 5-1 CURRENT AND FUTURE DPRI PROJECTS ANDERSEN AFB - VEGETATION COMMUNITIES
Future Projects Area
DOD Lands
Vegetation Classification
Barren/Sandy Beach/Bare Rocks
Casuarina Forest
Coconut Forest
Developed
Eugenia Forest
Mixed Limestone Forest – Disturbed
Mixed Limestone Forest – Primary
Mixed Limestone Forest – Secondary
Neisosperma Forest
Ochrosia Edge
Strand Vegetation
Mixed Shrub
Tangantangan
Urban Cultivated
Vitex - Closed/Sparse
Water
Vegetation Data: Guam Relocation FEIS/ Andersen AFB 2008c
Area Enlarged
Philippine Sea
Pacific Ocean
0 500 1,000 1,500 2,000 FEET
0 150 300 450 600 METERS
NAVFAC
DATE: 02 Apr 2013
FOR OFFICIAL USE ONLY
FOR OFFICIAL USE ONLY
P109 - Aircraft Maintenance Hangar (North Ramp) (Final North Ramp U&SI 1391 12/19/12)
J200 - North Ramp U&SI (Final North Ramp U&SI 1391 12/19/12)
P101A FY2013 - North Ramp Parking II (North Ramp 100% DB RFP 09/27/12)
P101 FY2009 - North Ramp Parking I (North Ramp Final Submittal 08/24/12)
P3202 - Air Freight Terminal Complex (Site Plan Boundary 03/09/12)
J001 JFY2009 - GOJ U&SI Phase 1, ACE Gate (Construction Limit 06/09/2011)
P100 FY2009 - North Ramp Utilities I (North Ramp Final Submittal 03/06/12)
J001 MOD - PC-08/09 Install Add'tl Duct Bank Near B34, AAFB
J001 JFY2009 - GOJ U&SI Phase 1, MOD (PC-08/09) (Comm Utility Site Plan 04/12/12)


FOR OFFICIAL USE ONLY
POLARIS POINT
J001 JFY2009 -
GOJ U&SI Phase 1, Apra Harbor
(J001 100% Submittal 30APR10)
P204/P204A FY2010 -
Apra Harbor Wharf Improvement
(P204 100% Submittal 1MAR10)
Inner Apra Harbor
NAVAL BASE GUAM
P1003 FY2010 -
Military Working Dog Relocation
(P1003 100% Submittal 6/27/11)
Pacific Ocean
Figure 5-2 CURRENT AND FUTURE DPRI PROJECTS NAVAL BASE GUAM - VEGETATION COMMUNITIES
Feet
Meters
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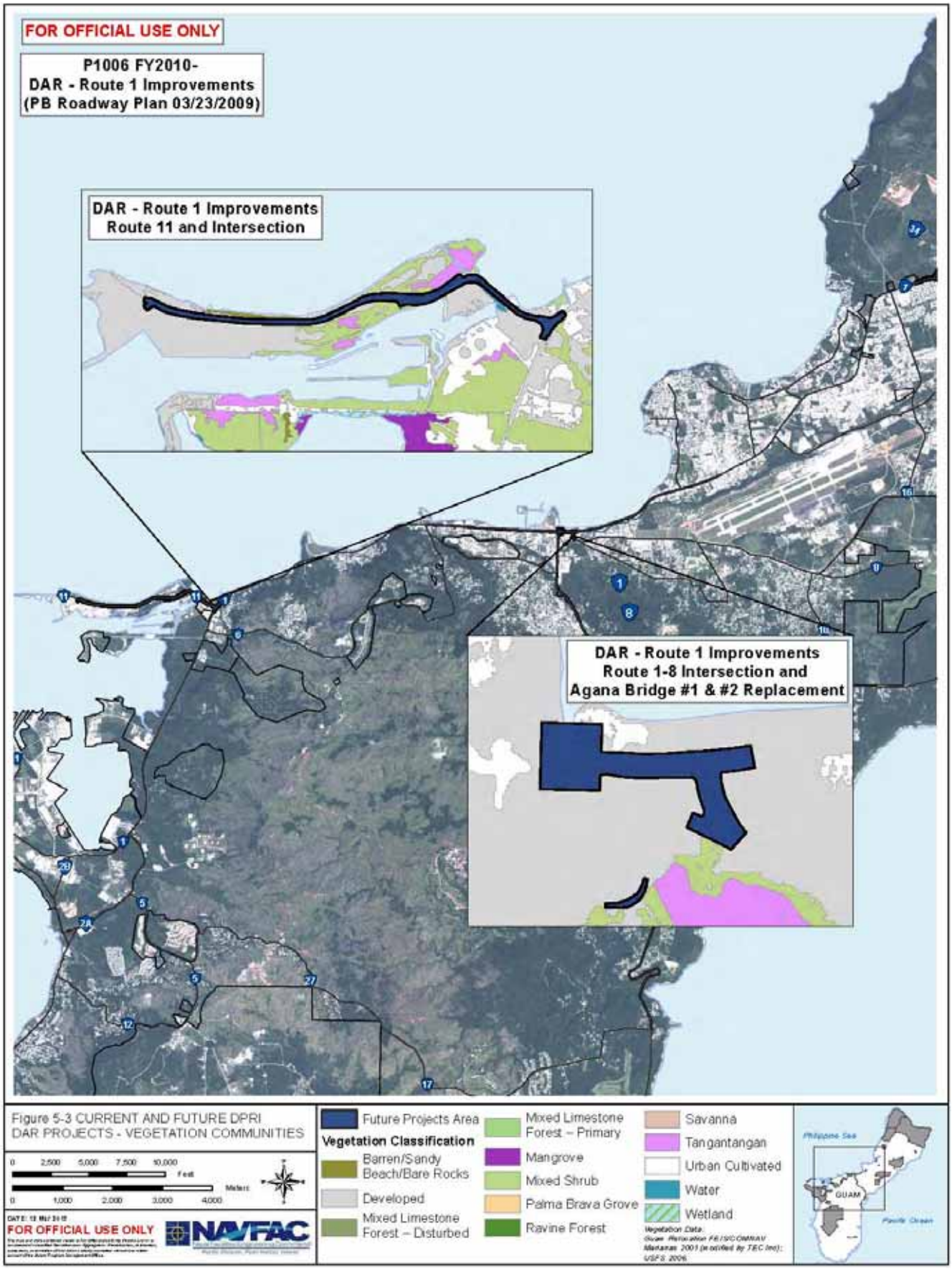
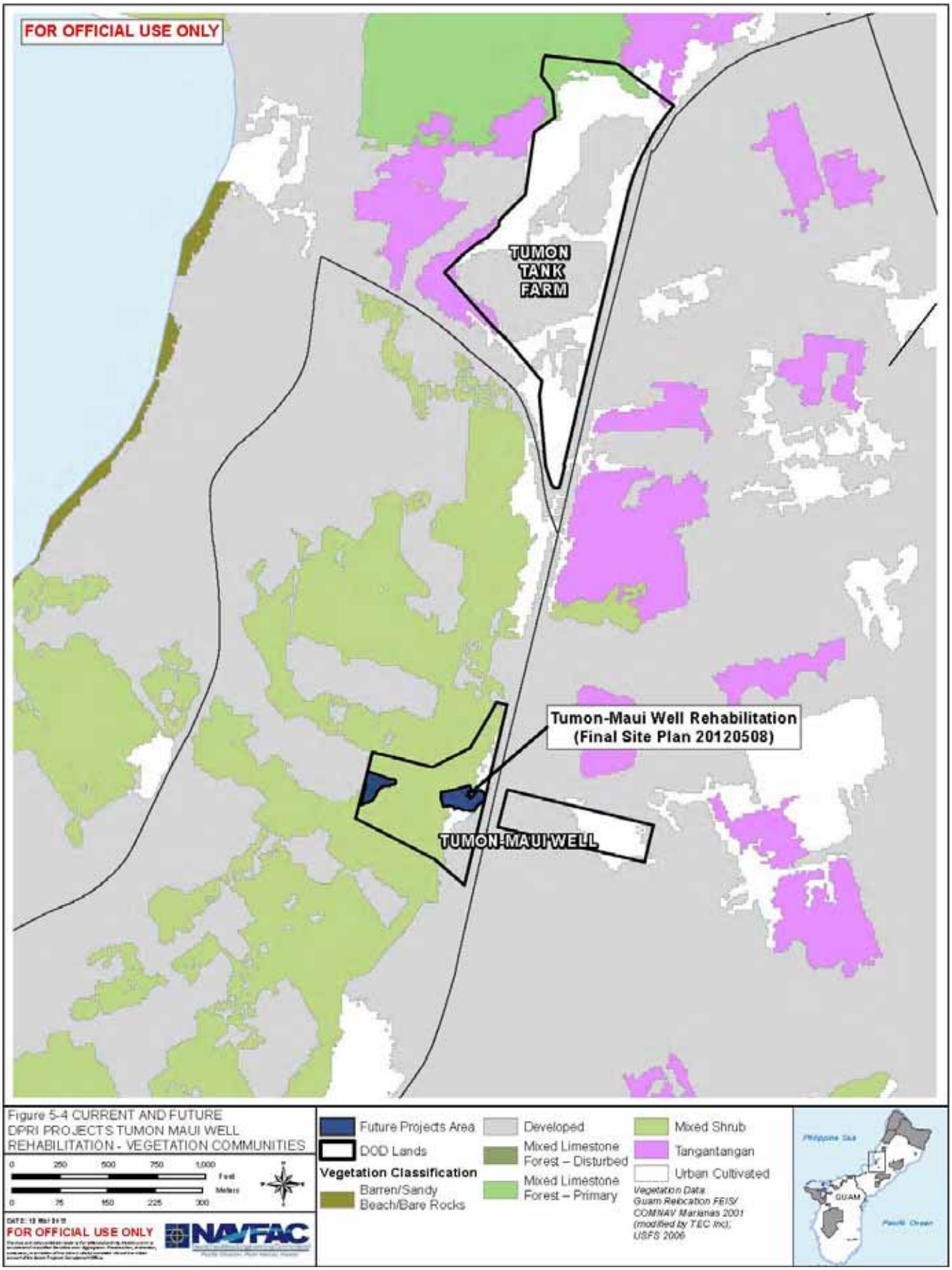
NAVFAC
Future Projects Area
DOD Lands
Vegetation Classification
Barren/Sandy Beach/Bare Rocks
Coconut Forest
Developed
Mangrove
Mixed Limestone Forest – Primary
Mixed Limestone Forest – Secondary
Mixed Shrub
Savanna
Strand Vegetation
Tangantangan
Urban Cultivated
Water
Wetland
Vegetation Data: Guam Relocation FEIS/COMNAV Marianas 2001; USFS 2006
Philippine Sea
GUAM
Pacific Ocean


FOR OFFICIAL USE ONLY
P1006 FY2010-
DAR - Route 1 Improvements
(PB Roadway Plan 03/23/2009)
DAR - Route 1 Improvements
Route 11 and Intersection
DAR - Route 1 Improvements
Route 1-8 Intersection and
Agana Bridge #1 & #2 Replacement
Figure 5-3 CURRENT AND FUTURE DPRI
DAR PROJECTS - VEGETATION COMMUNITIES
0 2,500 5,000 7,500 10,000
Feet
0 1,000 2,000 3,000 4,000
Meters
FOR OFFICIAL USE ONLY
NAVFAC
Future Projects Area
Vegetation Classification
Barren/Sandy Beach/Bare Rocks
Developed
Mixed Limestone Forest – Disturbed
Mixed Limestone Forest – Primary
Mangrove
Mixed Shrub
Palma Brava Grove
Ravine Forest
Savanna
Tangantangan
Urban Cultivated
Water
Wetland
Philippine Sea
GUAM
Pacific Ocean


FOR OFFICIAL USE ONLY
TUMON TANK FARM
Tumon-Maui Well Rehabilitation (Final Site Plan 20120508)
TUMON-MAUI WELL
Figure 5-4 CURRENT AND FUTURE DPRI PROJECTS TUMON MAUI WELL REHABILITATION - VEGETATION COMMUNITIES
0 250 500 750 1,000 Feet
0 75 150 225 300 Meters
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NAVFAC
Future Projects Area
DOD Lands
Vegetation Classification
Barren/Sandy Beach/Bare Rocks
Developed
Mixed Limestone Forest – Disturbed
Mixed Limestone Forest – Primary
Mixed Shrub
Tangantangan
Urban Cultivated
Vegetation Data: Guam Relocation FEIS/ COMNAV Marianas 2001 (modified by TEC Inc); USFS 2006
Philippine Sea
GUAM
Pacific Ocean

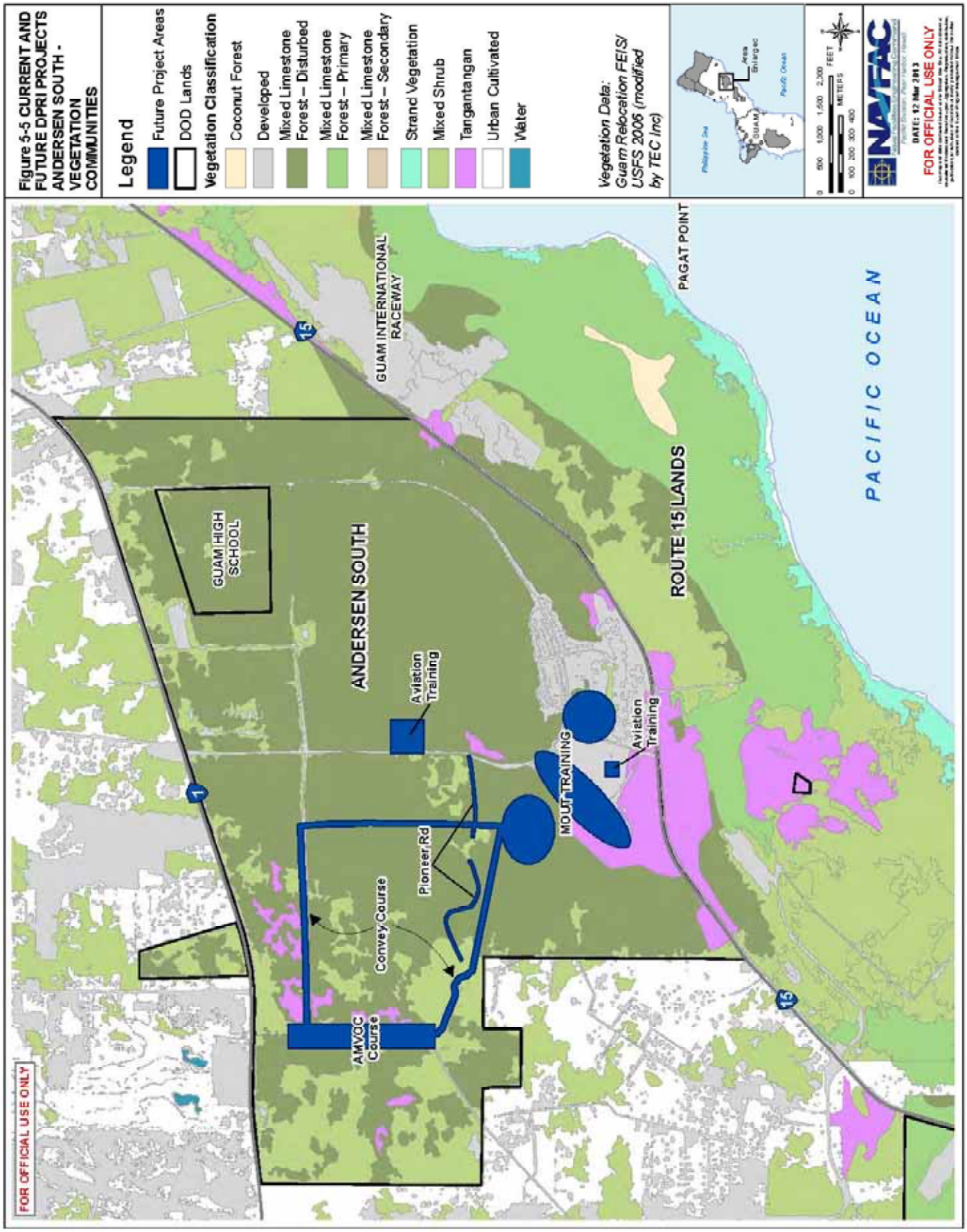
Figure 5-5 CURRENT AND FUTURE DPRI PROJECTS ANDERSEN SOUTH - VEGETATION COMMUNITIES
Legend
Future Project Areas
DOD Lands
Vegetation Classification
Coconut Forest
Developed
Mixed Limestone Forest – Disturbed
Mixed Limestone Forest – Primary
Mixed Limestone Forest – Secondary
Strand Vegetation
Mixed Shrub
Tangantangan
Urban Cultivated
Water
Vegetation Data: Guam Relocation FEIS/ USFS 2006 (modified by TEC Inc)
Area Enlarged
GUAM
Philippine Sea
Pacific Ocean
METERS
FEET
NAVFAC
DATE: 12 Mar 2013
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GUAM INTERNATIONAL RACEWAY
PAGAT POINT
PACIFIC OCEAN
GUAM HIGH SCHOOL
ANDERSEN SOUTH
ROUTE 15 LANDS
Aviation Training
MOUT TRAINING
Aviation Training
Pioneer Rd
Convoy Course
AMVOC Course
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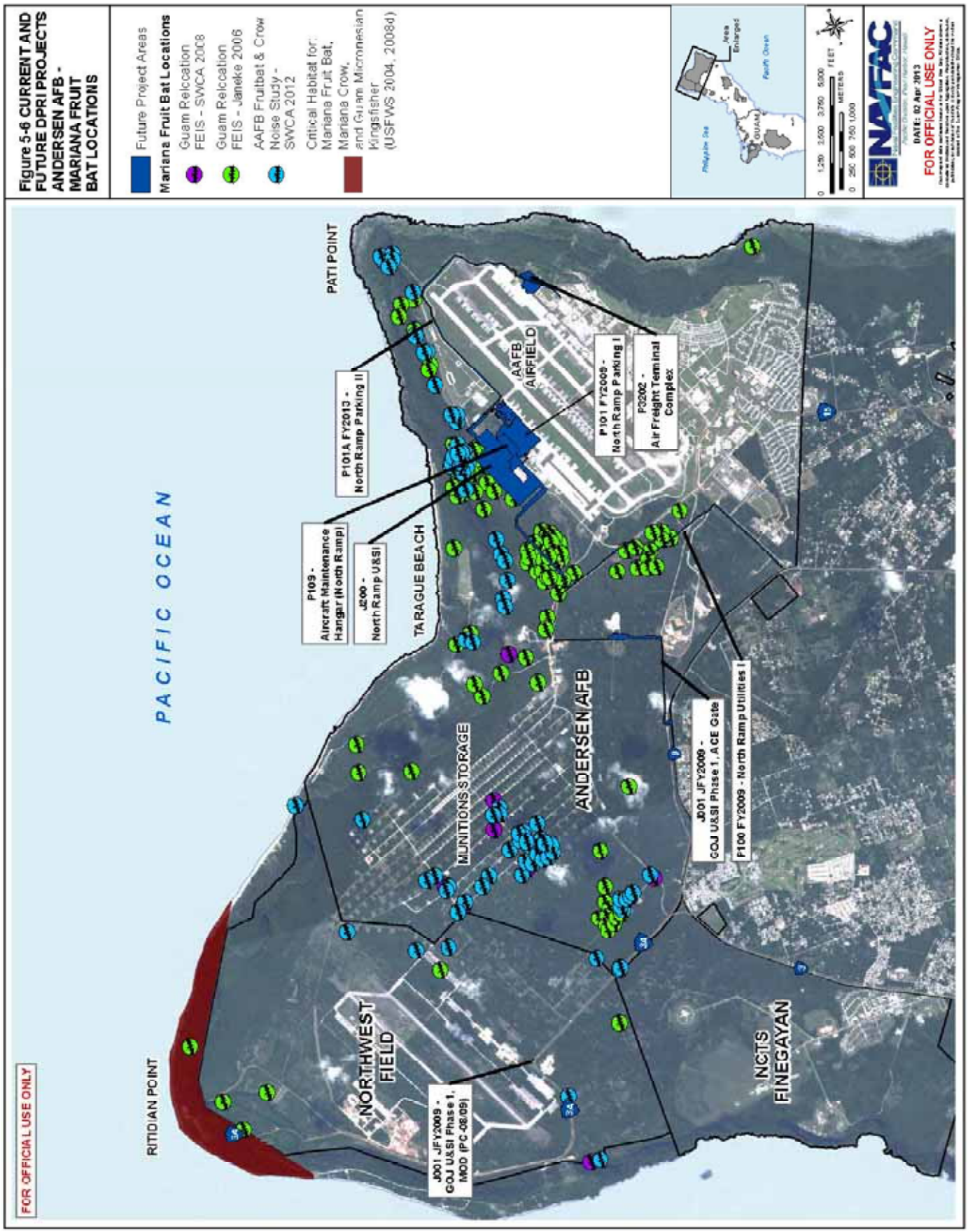
Figure 5-6 CURRENT AND FUTURE DPRI PROJECTS ANDERSEN AFB - MARIANA FRUIT BAT LOCATIONS
Future Project Areas
Mariana Fruit Bat Locations
Guam Relocation FEIS - SWCA 2008
Guam Relocation FEIS - Janeke 2006
AAFB Fruitbat & Crow Noise Study - SWCA 2012
Critical Habitat for: Mariana Fruit Bat, Mariana Crow, and Guam Micronesian Kingsfisher (USFWS 2004, 2008d)
Philippine Sea
GUAM
Pacific Ocean
Area Enlarged
0 1,250 2,500 3,750 5,000 FEET
0 250 500 750 1,000 METERS
NAVFAC
DATE: 02 Apr 2013
FOR OFFICIAL USE ONLY
FOR OFFICIAL USE ONLY
PACIFIC OCEAN
RITIDIAN POINT
PATI POINT
NORTHWEST FIELD
TARAGUE BEACH
MUNITIONS STORAGE
ANDERSEN AFB
AAFB AIRFIELD
NCTS FINEGAYAN
J001 JFY2009 - GOJ U&SI Phase 1, MOD (PC-08/09)
P101A FY2013 - North Ramp Parking II
P103 - Aircraft Maintenance Hangar (North Ramp)
J200 - North Ramp U&SI
P101 FY2009 - North Ramp Parking I
P3202 - Air Freight Terminal Complex
J001 JFY2009 - GOJ U&SI Phase 1, ACE Gate
F100 FY2009 - North Ramp Utilities I

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CHAPTER 6
CUMULATIVE EFFECTS ANALYSIS

"Cumulative effects" under the ESA are those effects of *future* State or private activities, *not* involving federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation [50 CFR 402.02].

The future state or private activities that are reasonably certain to occur in the action areas include the following:

- Commercial and recreational fishing
- Tourism
- Commercial shipping
- Private development
- Natural resources management

Implementing the Proposed Action in conjunction with other past, current, and future activities could affect terrestrial biological resources within the action areas. Several ongoing or successional activities can contribute cumulatively to habitat degradation, including disturbance to soils and vegetation, spread of invasive non-native species, an increase in erosion and sedimentation, and impacts on native plant and animal species. Additionally, the development of Guam over the next few years on non-DoD lands may increase pressure on terrestrial habitats within DoD lands and development on DoD lands may increase pressure on terrestrial habitats on non-DoD lands. Although individual effects may be less than significant, collectively they have the potential to be cumulatively significant over time. Potential cumulative effects are difficult to foresee.

A discussion of the cumulative impacts of other federal projects within the action areas can be found in the JGPO Military Relocation FEIS.

CHAPTER 7
CONCLUSION

The DON has made the determination that the Proposed Action is not likely to affect the Mariana fruit bat.

The DON has made the determination that the effects to the Mariana fruit bat are insignificant and. This is based on our assessment that the size of the impact should never reach the scale where take to the Mariana fruit bat occurs. Our assessment is supported by (1) the minimal impacts to vegetation suitable to provide habitat for the Mariana fruit bat, (2) the reduced numbers of Mariana fruit bat known to utilize the available habitat on Guam and (3) the previous biological opinion (USFWS 2010) determination that impacts to Mariana fruit bat were in the form of harassment due to loud aircraft noise resulting from the Proposed Action.

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CHAPTER 8
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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

In Reply Refer To:
2013-F-0249
2010-F-0122

Mr. Joseph Ludovici
Director, Joint Guam Program Office
Department of the Navy
Office of the Assistant Secretary
(Energy, Installations, and Environment)
1000 Navy Pentagon
Washington, D.C. 20350-1000

MAY 0 3 2013

Subject: Re-initiation of Consultation for the Joint Guam Program Office (JGPO) Relocation of the U.S. Marine Corps (USMC) from Okinawa to Guam and Associated Activities on Guam and Tinian

Dear Mr. Ludovici:

Thank you for your request to re-initiate consultation on the "Biological Opinion (BO) for the JGPO Relocation of the USMC from Okinawa to Guam and Associated Activities on Guam and Tinian (2010-F-0122). We appreciate the early coordination between our offices and efforts on the part of Department of Navy (DoN) staff related to the preparation of the biological assessment. Unfortunately, additional information is necessary to complete this re-initiation of consultation.

As discussed in the 9 April 2013 meeting between the DoN and the Service, the Service feels that additional discussion between the DoN and Service is needed to determine if re-initiation of consultation or an amendment to the aforementioned BO would be the best mechanism to address DoN concerns related to changes in the action. To ensure the Service has a clear understanding of JGPO conservation measures that have been initiated under the existing BO, we request a table listing project activities and linked measures that mitigate impacts to listed species. It should be noted that the Service feels the DoN should be consulting on Guam listed avifauna within this re-initiation. The Service also feels that brown treesnake interdiction and control measures within the "Project Description" and "Conservation Measures" of the original JGPO BO should remain in the re-initiation.

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We appreciate the opportunity to assist you with the proposed project. If you have any questions or concerns about this consultation, please feel free to contact Leilani Takano, Fish and Wildlife Biologist, at (671) 355-5096 or leilani_takano@fws.gov.

Sincerely,

Loyal Mehrhoff
Field Supervisor

DEPARTMENT OF THE NAVY

OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS & ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350 - 1000

Dr. Loyal Mehrhoff
Field Office Supervisor
U.S. Fish and Wildlife Service
Pacific Islands Field Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, HI 96850

SEP 10 2013

Dear Dr. Mehrhoff:

The Department of the Navy (DON) requests your concurrence with enclosure (1), which is a list of federally listed species and designated critical habitat present within the U.S. Territory of Guam. The DON will use this list to assess whether the proposed relocation of U.S. Marines (Marines) to Guam will result in the need to consult with your office in accordance with Section 7 of the Endangered Species Act. Chapters one and two from an internal working version of the Draft Supplemental Environmental Impact Statement (Draft SEIS) for the *Guam and CNMI Military Relocation (2012 Roadmap Adjustments)* are set forth as enclosure (2), providing a description of the proposed action and alternatives to assist your office with this request. Due to the complexity of the proposed action, and your office's past inquiries on the scope of the action to be included in the Draft SEIS, the DON is enclosing chapters one and two to provide a complete description of the proposed action and alternatives. The DON emphasizes that providing these chapters is at its discretion and specific to this consultation and proposed action. Consequently, there should be no expectation that future DON action proponents will similarly exercise this discretion as part of the initial consultation process. Please note that enclosure (2) is currently undergoing Federal cooperating agency review. As such, it must not be shared or discussed with anyone outside of your office without the prior permission of the DON.

The proposed action analyzed in the Draft SEIS is to construct and operate a live-fire training range complex on Guam that allows for simultaneous use of all firing ranges to support training and operations of the relocated Marines, and a main cantonment area of sufficient size and layout to provide military support functions, including family housing. The proposed action also includes the construction of necessary utilities and infrastructure. The Draft SEIS does not include the transient aircraft carrier berthing in Apra Harbor or the Army Air and Missile Defense Task Force.

The DON will also coordinate with the Service in accordance with Section X. E of the 1994 Cooperative Agreement between the U.S. Navy and the U.S. Fish and Wildlife Service for the Establishment and Management of the Guam National Wildlife Refuge. Specifically, the DON will coordinate with the Service's designated or successor Project

Officer on potential project impacts of the proposed action on DON lands included within the Guam National Wildlife Refuge and identified as providing essential habitat for the endangered Mariana fruit bat, Guam rail, Guam Micronesian kingfisher, Mariana crow, Vanikoro swiftlet, Mariana common moorhen, hayun lagu tree; and habitats identified in other recovery plans, or beaches and reefs used for nesting and foraging by endangered and threatened sea turtle species.

The DON recognizes the Service is in the process of developing a proposal for listing species and designating associated critical habitat in the Mariana Archipelago as part of a nationwide settlement agreement addressing the Endangered Species Act candidate species backlog. It is our understanding that a proposed rule on these species and associated critical habitats is anticipated by September 28, 2014. In accordance with Section 7(a)(4) of the Endangered Species Act, the DON will confer with your office if we determine that our action is likely to jeopardize the continued existence of any species proposed for listing or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. Until such time, we request that the Service provide the DON notification at the earliest opportunity of its intent to propose species for listing or critical habitat for designation. It is our hope that this early coordination will foster open communications and allow a smooth and speedy process in the event the Service proposes such listing or designation and conferral is required.

We look forward to your response, and request you provide your technical point of contact for this consultation. Our technical point of contact is Ms. Coralie Cobb, Naval Facilities Engineering Command, Southwest. For technical questions, please contact her at (720) 542-3085 or email at coralie.cobb@navy.mil. If you have any questions regarding this request or would like a briefing on the proposed action please contact Mr. J. Dan Cecchini, JGPO Environmental Director, at (703) 602-4725 or e-mail at joseph.cecchini@navy.mil.

Sincerely,

Joseph Ludovici
Director, Joint Guam Program Office

Copy To:
Joint Region Marianas
NA VFAC Marianas
NAVFAC Pacific
Marine Forces Pacific DPRI
HQMC (I&L), (PP&O)
CNO (N45)

CNIC (N45)
Headquarters, Pacific Air Forces
Headquarters, Naval Facilities Engineering Command

Federally listed species and designated critical habitat present within the U.S. Territory of Guam[1]

FEDERALLY LISTED SPECIES		
Common Name	**Scientific Name**	**ESA Listing Status**
Mariana gray swiftlet	*Aerodramus vanikorensis bartschi*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Mariana common moorhen	*Gallinula chloropus guami*	Endangered
Mariana fruit bat	*Pteropus mariannus*	Threatened
Hayun lagu	*Serianthes nelsonii*	Endangered

DESIGNATED CRITICAL HABITAT	Area
Guam National Wildlife Refuge Ritidian Point Unit	376 acres (152 hectares)

Notes:
1. The Action Area for this consultation will include portions of Guam

DEPARTMENT OF THE NAVY

OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS & ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350 - 1000

January 30, 2014

Dr. Loyal Mehrhoff
U.S. Fish and Wildlife Service
Pacific Island Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, HI 96850

Dear Dr. Mehrhoff:

Thank you for your response of May 3, 2013 to our request to re-initiate consultation on Biological Opinion 2010-F-0122 (hereinafter "BO") for the subject proposed military realignment of U.S. Marines to Guam. Your letter stated that in order to move forward with the consultation, additional information from our office was needed including: (1) additional discussions to determine if re-initiation of consultation or an amendment to the BO would be the best mechanism to address the requested changes to the BO; and (2) a table listing project activities and linked conservation measures that mitigate impacts to listed species to ensure the Service has a clear understanding of the conservation measures that the Department of the Navy (DON) has initiated under the BO. In addition, the letter provided the Service's thoughts on which listed species that should be included in the consultation and the inclusion of brown tree snake (BTS) interdiction and control measures from the BO, and communicated the Service's belief that the DON should consult on Guam listed avifauna (read: extirpated species).

Enclosure (1) provides a summary of our communications with your office, the Pacific Regional Office (PRO), and the Regional Solicitor's Office (SOL) which have occurred since May 3, 2013 relevant to our request to reinitiate consultation. Enclosure (2) provides the requested table (hereinafter "Crosswalk Table") as revised to address your office's comments on an earlier version.

Enclosure (3) provides the minutes of our discussions with the PRO and Regional SOL. While these discussions confirmed our position that re-initiation vice amendment was the appropriate course of action with regards to those interim actions occurring between 2010 and 2015 which remain final and not subject to further analysis in the ongoing Supplemental Environmental Impact Statement (SEIS) for the 2012 Roadmap Adjustments, we are fast approaching the public release of the Draft SEIS. JGPO therefore recommends formally terminating the interim consultation and including the analysis of interim actions in the new consultation for the 2012 Roadmap Adjustments.

The DON still believes there is no legal requirement to include extirpated species in the consultation on the interim actions and actions resulting from the 2012 Roadmap Adjustments. Nevertheless, the BA currently under development by JGPO will include extirpated species, adopting (over our objection) the "reasonably certain" standard as described and documented in Enclosure (3), and the Service's analytical framework as presented in the 2010 BO. Per the PRO's advice -- as recently affirmed by the Department of the Interior Deputy Solicitor for Fish, Wildlife, and Parks -- our situation can be distinguished from a project that would be completed in the near term and where the effects of an action are not likely to persist and overlap the period when reintroduction of the currently extirpated species is reasonably certain to occur and the species are likely to be exposed to those effects. We further note in the case of such near term projects, consultation may not need to include extirpated species depending on whether overlap occurs between the effects of an action and the anticipated reintroduction into the wild of the currently extirpated species.

Finally, recalling that the conservation measures included in the BO were tied to the intensity of development, tempo of construction, and population increase related to direct, indirect, and induced-growth caused by the Marine Corps relocation to Guam based on the 2006 Realignment Roadmap, JGPO will consider potential additional BTS interdiction efforts on Guam in the SEIS and associated BA, as appropriate, based upon the analysis of impacts from the revised proposed action per the 2012 Roadmap Adjustments. The DON remains committed to implementing existing Department of Defense BTS interdiction programs on Guam.

Please let us know as soon as possible if the Service has concerns with JGPO's proposal to terminate the interim consultation. If we do not hear from you by February 28, 2014 we will consider the interim consultation formally terminated. If you have any questions, please feel free to contact Mr. Dan Cecchini, at (703) 602-4725 or email at joseph.cecchini@navy.mil.

Sincerely,

Joseph Ludovici
Director, Joint Guam Program Office

Enclosures:
1. Interagency Communications Summary (May 3, 2013 – Present)
2. Crosswalk Table – Conservation Measures with Response to Comments
3. Meeting Minutes from October 24, 2013 Call Between FWS PRO & JGPO

Copy to: DASN(E)
Joint Region Marianas

NAVFAC Marianas
NAVFAC Pacific
Marine Forces Pacific DPRI
HQMC (I&L), (PP&O)
CNO (N45)
CNIC (N45)
Headquarters, Pacific Air Forces
Headquarters, Naval Facilities Engineering Command

INTERAGENCY COMMUNICATIONS SUMMARY
(MAY 3, 2013 TO PRESENT)

Background

On April 27, 2012, the U.S.-Japan Security Consultative Committee announced its decision to adjust plans outlined in the May 2006 Roadmap for Realignment Implementation (which the BO was based on). The adjustment resulted in a significantly smaller and reconfigured force on Guam. In response to this announcement, in May 2012 the DON decided to prepare a Supplemental EIS (SEIS) to evaluate this change. Recognizing that some projects/actions on Guam were already underway or would be unaffected by the change in force structure (and thus not included in the SEIS), JGPO notified the Service in September 2012 of its plans to request an amendment to the BO to address those unaffected 2010-2015 projects/actions (hereinafter "interim actions"). These interim actions are those actions on Guam not affected by the 2012 Roadmap Adjustments and not subject to further analysis in the ongoing SEIS. On October 12, 2012, the Service stated that a consultation re-initiation request and Biological Assessment (BA) (versus an amendment to the BO) was necessary to address the changes in the action. After review of 50 CFR §402.16, JGPO agreed that the requirements for re-initiation of consultation had been met because: (1) the change in the action may affect listed species in a manner or to an extent not considered in the original opinion [a lesser affect], and (2) the proposed action has been subsequently modified in a manner that causes a [lesser] effect to the listed species not considered in the original opinion. Consequently, on April 3, 2013, after investing substantial time and funds, JGPO submitted the BA with a conclusion that the interim actions would "not likely to adversely affect" the Mariana fruit bat.

DON / Service Engagement – Interagency Communications Summary

- **May 30, 2013.** JGPO responded to the Service's letter of May 3, 2013, and provided the requested table (hereinafter "Crosswalk Table"). This Crosswalk Table listed project activities and linked conservation measures that avoid, minimize, and compensate for the impacts associated with the interim actions. JGPO also provided a color coding of all the conservation measures included in the BO to delineate which conservation measures have been implemented and those measures which have not been triggered or will not be triggered/implemented based on the current proposed adjustments to the action and/or Congressional funding restrictions.
- **July 8, 2013**. JGPO met with representatives from your office in Hawaii to discuss the Crosswalk Table and to continue discussions on the consultation re-initiation for the interim actions. At this meeting, the issue of re-initiation versus BO amendment was discussed, but no resolution reached. The Service did, however, state its position that a BO amendment was the preferred method to address the interim actions. In addition, your office requested time to provide comment and feedback on the Crosswalk Table.
- **August 23, 2013.** The Service provided its comments to JGPO. Enclosure (2) includes JGPO's response to the Service's comments on the Crosswalk Table.
- **August 28, 2013.** Per email, the DON provided its rationale to the Service supporting its determination that consultation on extirpated species was not legally required.[1]

[1] See email with attachment from Dan Cecchini, JGPO Environmental Director to Loyal Mehrhoff, USFWS dated August 28, 2013

- **September 11, 2013**. During a conference call between JGPO and the Service, the participants agreed that the extirpated species issue required elevation to the Service's Pacific Regional Office (PRO) and Regional Office of the Solicitor (SOL).
- **October 24, 2013.** JGPO, the PRO, and Regional SOL Office via conference call discussed the subjects of extirpated species consultation and the need to reinitiate versus amend the BO for the interim actions. Enclosure (3) provides the meeting minutes for this call.
  - The PRO and the Regional's SOL Office advised JGPO that re-initiation would be the appropriate method to address the effects of the interim actions on listed species.
  - Although the PRO and Regional SOL agreed that current regulations and published Service guidance do not specifically address this situation, they noted that formal consultation on effects to currently extirpated species is not unprecedented and has occurred with respect to other extirpated species. All parties agreed that Guam presents a unique and challenging situation.
  - The PRO and the SOL Office noted that the implementing regulations for ESA Section 7 may not have contemplated the issue of extirpated species, but, for the reasons described above, a "may affect" finding here is consistent with the regulations as written and is warranted in this case. The PRO advised that this situation could be distinguished from a project that would be completed in the near term and where the effects of the action are not likely to persist and overlap the period when reintroduction of the currently extirpated species *is reasonably certain* to occur and the species are likely to be exposed to those effects.
  - In the case of near term projects, consultation may not need to include extirpated species depending on whether overlap occurs between the effects of the action and the anticipated reintroduction into the wild of the currently extirpated species.
- **December 2013.** The DON's Assistant General Counsel for Energy, Installations, and Environment reconfirmed the PRO's position in discussions with the Department of the Interior's Deputy Solicitor for Fish, Wildlife, and Parks.

October 24, 2013 Conference Call between the DON and the FWS Pacific Regional Office regarding DON Proposed Actions on Guam and ESA Section 7 Compliance

Attendees:
Dan Cecchini (JGPO)
Coralie Cobb (NAVFAC Southwest)
Kelly Ebert (DASN E)
Diane Hoobler (DOI Pacific NW Office of the Regional Solicitor; SOL Office)
Jeff Luster (JGPO)
Larry Salata (FWS Pacific Regional Office; PRO)
Terry Rabot (FWS PRO)
Mike Roy (FWS PRO)

Meeting/Call Summary:

1. Principal Discussion Points:

a. The FWS PRO and the SOL Office agreed with the DON that re-initiation of the initial consultation on the DON's proposed relocation of Marines from Okinawa to Guam is warranted to address the effects of interim DON actions on Guam on listed species. Interim actions are defined by the DON as those actions on Guam not affected by the 2012 Roadmap Adjustments and not subject to further analysis in the ongoing SEIS. The FWS PRO & SOL Office have also determined, in coordination with the Service's Pacific Islands Fish and Wildlife Office, that three currently extirpated listed species (i.e., crow, kingfisher, and rail) may be indirectly affected by these interim actions need to be included in the DON's re-initiation request. The DON disagrees.

b. The PRO summarized the basis for its position that consultation on the effects of JGPO actions on currently extirpated species is warranted because these activities are likely to cause indirect effects[1] to these species when they are reasonably certain to be reintroduced into the wild on Guam. The FWS is concerned that the magnitude of habitat loss and degradation caused by the proposed JGPO actions could preclude the capability of habitat on Guam to support the survival and recovery of the kingfisher, rail, and the crow in the wild. Although current regulations and published FWS guidance do not specifically address this situation, the FWS noted that formal consultation on effects to currently extirpated species is not unprecedented and has occurred with respect to the black-footed ferret when its population was entirely in captivity and to a listed species in the SW where the Army Corps of Engineers agreed to formally consult on the effects of their proposed action on that species which is likely to be reintroduced and subject to indirect effects of the Corps' action. All parties agreed that Guam presents a unique and challenging situation. (***Note: DON disagreed with FWS interpretation of the black-footed ferret consultation.***). The PRO and the SOL Office noted that the implementing regulations for ESA

[1] Indirect effects - those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. [50 CFR §402.02]

Section 7 may not have contemplated the issue of extirpated species, but, for the reasons described above, a "may affect" finding here is consistent with the regulations as written and is warranted in this case. The PRO also noted that the DON has both a consultation and a conservation obligation under Section 7 of the ESA that must be addressed in the process of designing and implementing the proposed action. The PRO advised that this situation could be distinguished from a project that would be completed in the near term and where the effects of the action are not likely to persist and overlap the period when reintroduction of the currently extirpated species is *reasonably certain to occur* and the species are likely to be exposed to those effects. (***Note: DON questioned what basis the "reasonably certain" statement could be made and that they were unaware of any timeline for re-introduction***). In the case of near term projects, consultation may not need to include extirpated species depending on whether overlap occurs between the effects of the action and the reintroduction into the wild of the currently extirpated species. The PRO also cited to the goals of Overlay Refuge Cooperative Agreement (CA), one goal of which is to provide for consultation on Federal government actions within the Overlay Refuge which may impact the habitat of extirpated species. The PRO disagreed with the DON's interpretation of the CA that such consultation could be anything other than consultation under Section 7 of the ESA.

c. In summary, the FWS PRO position is that since the relocation of Marines to Guam will result in operations which will be indefinitely on-going into the future, coupled with Overlay Refuge CA goals & Brown Tree Snake (BTS) eradication efforts to date, it follows that the proposed action is an instance which requires consultation on effects to the extirpated species listed above.

2. Discussion and Meeting Minutes

a. Introductions and Welcome

b. Issues: (1) Consultation (BA.1A) on interim actions not changed by the 2012 Roadmap Adjustment, and (2) consultation on extirpated species on Guam.

(1) Background:

- JGPO summarized its work over the past six years with the Pacific Islands Fish and Wildlife Office (PIFWO) on this project.
- JGPO discussed the 2012 Roadmap Adjustments which require DON to do supplemental environmental planning for some of the actions. JGPO advised that those actions which remain final under the 2010 ROD and are not subject to further analysis have been or will be implemented in the interim (hereinafter "2010-2015 actions").
- JGPO also discussed past efforts to amend the 2010 BO in September of 2011 and September 2012. PIFWO accepted the 2011 request to amend; however, the 2012 request was not accepted and PIFWO requested in September 2012 that DON re-initiate consultation under ESA Section 7.

- JGPO explained that during the development of the "interim actions" BA, the DON reviewed the regulatory requirements and associated FWS published guidance regarding Section 7 consultation and could not find any authority supporting a requirement to consult on extirpated species. JGPO also noted that the DON had invested considerable money and time and submitted a BA to cover the 2010-2015 actions in April 2013.
- JGPO discussed that in May 3, 2013, PIFWO responded to the BA and expressed a preference to reverse their direction to re-initiate consultation and instead amend the 2010 BO, noting that extirpated species needed to be included in the consultation.

(2) **Discussion:**

- The PRO expressed gratitude to the DON for its efforts to date to conserve species on Guam and recognizes that the DON has invested a great amount in BTS eradication and control. The PRO hoped that the DON will continue its efforts with regard to BTS eradication and species conservation.
- The PRO interpreted the CA as requiring consultation under ESA on extirpated species.
- Both the PRO and DON clarified the scope and purpose of the BA for interim actions. The DON explained the difference between the Proposed Action as analyzed in the 2010 Final EIS and the 2012 Roadmap Adjustments. The DON further explained that the number of Marines was reduced, and that the Army and CVN elements are no longer part of the revised action. Because of these changes, the DON indicated that there are a handful of projects under the original 2010 ROD that will not change and remain final. The DON advised that it was faced with what to do about those interim projects from an ESA consultation standpoint, since the original 2010 BO conservation measures were based on the larger 2010 scope of the project.
- The PRO asked if DON is re-initiating consultation or relying on the 2010 BO. The DON responded that its intent was to re-initiate consultation based on the September 2012 request by PIFWO. DON again noted that PIFWO has indicated it now thinks an amendment to the BO is appropriate.
- The PRO agreed that DON should not rely on the 2010 BO. The PRO provided its opinion that DON should re-initiate consultation, and that such consultations should include extirpated species.
- The PRO expressed concern about incrementing/piece-mealing the action through multiple consultations. The DON explained the actions that remain unchanged are independent of the 2012 Adjustments and the proposed relocation. These interim actions are not affected and thus under NEPA are not required for further analysis. Under the 2010 ROD the Live Fire Training Range Complex decision was deferred, and the change in the number of Marines represents a substantial change in circumstances. So, in DON's opinion, these are not incremental or piecemeal actions.
- The PRO inquired if DON would undertake these interim projects if the Marines weren't moving to Guam. DON responded that while some have independent utility, like the

wharf, they will also support the Marines and other actions on Guam. The independent value of these interim actions has been briefed to Congress. The PRO and DON agreed that DON has modified the proposed action analyzed in the 2010 BO to a point where re-initiation of consultation is warranted.

- The PRO summarized the basis for its position that consultation on extirpated species is required. Since the extirpated species are likely to be reintroduced to the action area during the lifespan of the project, the species are likely to be present and may be affected by the proposed action. In addition, current case law interpreting the Services' joint regulations (i.e., the definition of "to jeopardize") requires the FWS to assess potential impacts to recovery as part of its jeopardy analysis. Based upon the situation on Guam, this emphasis on recovery would extend to those extirpated species whose reintroduction to the action area is likely over the projected lifespan of the proposed action. The PRO further advised that a project which would be completed in the near term could present a factual situation in which consultation did not include extirpated species if reintroduction was unlikely in the near term, the project had independent utility, and the indirect effects of the action are not likely to persist and overlap the period when reintroduction of the currently extirpated species is reasonably certain to occur and the species are likely to be exposed to those effects ***(Note: DON questioned if there was a reintroduction plan and/or timetable. To our knowledge there is no plan or timetable for reintroduction).*** The PRO noted that formal consultation on the effects of proposed actions on species that are currently extirpated from the wild but are likely to be reintroduced into the wild is consistent with Biological Opinions (BiOp) addressing the black-footed ferret and the Verde plume in the southwest U.S. The PRO expressed its disagreement with the DON's interpretation of the black-footed ferret BiOp as communicated to the PIFWO in August 2013, stating that that the consultation clearly involved an extirpated species.
- The PRO expressed its disagreement with the DON's interpretation of the CA as communicated to the PIFWO in August 2013, asserting that the consultation contemplated by the CA goals was consultation under Section 7 of the ESA. The PRO provided its interpretation of the Overlay Refuge CA. The PRO emphasized the goals of Overlay Refuge CA, one goal of which is to provide for consultation on Federal government actions within the Overlay Refuge that may impact the habitat of extirpated species. Regarding the consultation and coordination procedures established under the CA, the PRO also noted the provision providing that the FWS will be the final authority on "scientific" matters whether a Federal action may affect a listed species.
- The DON provided its interpretation of the CA, noting the distinction the agreement made between consultation required under Section 7 of the ESA and the coordination process established under the agreement to address essential habitat of extirpated species. The PRO expressed that consultation on the species under ESA is the most appropriate mechanism that we have to support the conservation of the species. The

PRO noted that there are only two reasons to stop working on a species: incorrect listing or recovery or extinction of the species.

- The DON summarized its understanding of FWS position. DON expressed concern that there is published section 7 guidance from various FWS field offices (e.g., New Jersey and Austin, Texas) that expressly states that there is no requirement to consult on extirpated species. In response, the PRO stated that its position here is not inconsistent with that guidance given the specific fact pattern in the Guam situation that demonstrates an overlap between the effects of DON's proposed actions and the time period when the currently extirpated species are likely to be reintroduced and exposed to those effects. The DON stated that ESA would require consultation once the species is present (re-introduced), and that to consult under ESA on species prior to that re-introduction is speculative. The PRO stated that because of all the investment in BTS control, the parties' commitment to the CA, and the term of the actions proposed by the DON, it is reasonable to assume the extirpated species [i.e., the kingfisher, rail, and the crow] will be reintroduced during the lifespan of the project and be subject to effects caused by the proposed action. On that basis, according to the PRO, a "may affect" determination is warranted.
- The DON expressed its continued commitment to conservation which is evident by all the work done by DON on Guam. However, DON thinks that the CA is the way to address habitat impacts, not ESA Section 7. DON questioned how the determination of likelihood of reintroduction was determined, noting the uncertainties associated with BTS eradication efforts. DON also asked: How does the existence of the BTS affect the determination of likelihood to reintroduce a species that is limited by the existence of the BTS? FWS reiterated that because of the Overlay Refuge, all of the past and ongoing work that has occurred on the Refuge and the belief that we will get the BTS under control that it is not speculative to assume these species will be reintroduced.
- DON thanked the FWS RO representatives for their time and requested to have a follow-up meeting/call between participating counsels. The meeting/call was scheduled for Friday, October 25, 2013.

DON Request for Formal Consultation under Section 7(a)(2) of the Endangered Species Act including the Biological Assessment for the Re-Initiation of Consultation Regarding the Proposed Military Relocation to Guam (September 30, 2014)

Note: The following document is what was provided to the USFWS, with one exception: the "Pre-Decisional, Not for Distribution, Draft, FOUO" language has been removed from the footer of the Biological Assessment.

DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

SEP 30 2014

Dr. Loyal Mehrhoff
Field Supervisor, Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
Department of the Interior
300 Ala Moana Boulevard Room 3-122 Box 50088
Honolulu, Hawaii 96850

Dear Mr. Mehrohoff:

In accordance with Section 7(a) (2) of the Endangered Species Act (ESA) and its implementing regulations [50 CFR Part 402], the Department of Navy (DON) is requesting formal consultation on the potential effects of the proposed military relocation to Guam. Enclosure (1) is the DON's biological assessment for the proposed action, and is provided for your review and consideration. The biological assessment contains all the required information to support the DON's request for formal consultation as described in 50 CFR § 402.14 (c) and the *Endangered Species Consultation Handbook* published by the U.S. Fish and Wildlife Service (USFWS) and the National marine Fisheries Service:

- A description of the action being considered;
- A description of the specific area that may be affected by the action;
- A description of any listed species or critical habitat that may be affected by the action;
- A description of the manner in which the action may affect any listed species or critical habitat, and an analysis of any cumulative effects;
- Relevant reports, including both the Draft Supplemental Environmental Impact Statement (SEIS) (April 2014) and the Final Environmental Impact Statement (FEIS) (July 2010) [via web link at www.guambuildupeis.us], and
- Other relevant information, including a description of the DON's revised preferred alternative for the main cantonment (Naval Computer and Telecommunications Station (NCTS) Finegayan), family housing (Andersen Air Force Base (AAFB)), and a live fire training range complex (LFTRC) (AAFB-Northwest Field).

On April 27, 2012, the U.S.–Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap. In accordance with the SCC's adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially

smaller force on Guam than previously proposed. That decision prompted the DON's review of the major actions previously planned for on Guam and approved in the September 2010 Record of Decision (ROD), and addressed in the September 2010 Biological Opinion. This review concluded that while some actions remain final and are not subject to further analysis, others, such as the main cantonment and family housing areas could significantly change. The DON has opted to address these changes in a SEIS, in addition to the proposed LFTRC on Guam. The impacts of those actions that remain final (i.e., air embarkation and operations at AAFB, wharf improvements and operations at Apra Harbor, and non-live fire training at Andersen South and the Naval Munitions Site) were fully and accurately analyzed in the July 2010 FEIS and are not subject to further analysis. The SEIS does not include the transient aircraft carrier berthing in Apra Harbor or the Army Air and Missile Defense Task Force, and these actions are not considered as part of the proposed action.

The decision regarding training ranges on Tinian is not affected by the 2012 Roadmap Adjustments, and remains final and is not subject to re-analysis in the SEIS. The DON intends to publish a combined Draft EIS and Overseas EIS (OEIS) for proposed CNMI Joint Military Training (CJMT) on the islands of Tinian and Pagan. Following completion of the CJMT NEPA process, the decision regarding proposed training ranges as evaluated in the CJMT EIS would supersede the 2010 ROD with regards to Tinian range projects. Consequently, the DON has deferred any implementation of the Tinian training ranges from the 2010 ROD pending the outcome of the CJMT EIS.

The proposed action addressed in this request for formal consultation includes the actions addressed in the SEIS to construct and operate a LFTRC on Guam that allows for simultaneous use of all firing ranges to support training and operations of the relocated Marines, and a main cantonment area of sufficient size and layout to provide military support functions, and family housing. Regarding family housing, the DON's preferred alternative in the 2014 Draft SEIS differs from the description of the proposed action included in this BA. In response to recommendations received during the Draft SEIS public comment period, the DON has identified a preferred alternative that would locate family housing at AAFB, while maintaining the main cantonment at NCTS_Finegayan and LFTRC at AAFB-NWF. The new preferred family housing alternative at AAFB moves the housing location from an undeveloped area at NCTS Finegayan to an area that is already developed as family housing on AAFB, thus avoiding the impacts to the habitat present in the southern portion of Finegayan and reducing the amount of required vegetation removal as analyzed in the Draft SEIS. The proposed action also includes the construction of necessary utilities and infrastructure. In addition to the actions included in the SEIS, the legacy actions analyzed in the FEIS and ROD (2010) are also included as part of the comprehensive proposed action. The DON has prepared the enclosed Biological Assessment to re-analyze the potential impacts on federally listed threatened and endangered species and designated critical habitat under the jurisdiction of the

USFWS from the comprehensive proposed action associated with the realignment of military forces to Guam.

On September 10, 2013, the DON requested a concurrence from your office on the list of federally threatened and endangered species, or designated critical habitat within the proposed action area. Your office's September 30, 2013, response provided a list of species recommend for inclusion in consultation, including three extirpated species: Mariana crow, Guam Micronesian kingfisher, and the Guam rail. The enclosed Biological Assessment includes an analysis of the potential impacts on the recovery of the three extirpated species using the recovery habitat criteria developed by the USFWS in the 2010 Biological Opinion. The Biological Assessment also analyzes the potential impacts to five extant species and designated critical habitat on Guam.

Based on this analysis, the DON has determined the comprehensive proposed action "may affect, but is not likely to adversely affect" the Mariana swiftlet, green sea and hawksbill sea turtles, and the Hayun lagu. The DON has determined the comprehensive proposed action is "likely to adversely affect" the Mariana fruit bat and, based solely on impacts to recovery, the extirpated Mariana crow, extirpated Guam rail, and extirpated Guam Micronesian kingfisher. The DON has determined that the comprehensive proposed action "may affect, but is not likely to adversely affect" designated critical habitat on Guam for the Mariana crow, Mariana fruit bat, and the Guam Micronesian kingfisher, and that the habitat would remain functional to serve its intended conservation role for the species.

The DON recognizes the USFWS is in the process of developing proposals for listing species and designating associated critical habitat in the Mariana Archipelago as part of a nationwide settlement agreement addressing the ESA candidate species backlog. It is our understanding that proposed rules on these species and associated critical habitats are anticipated by September 28, 2014, and in early 2015, respectively. In accordance with Section 7(a)(4) of the ESA, the DON will confer with your office if it determines that the proposed action is likely to jeopardize the continued existence of any species proposed for listing or result in the destruction or adverse modification of habitat proposed for designation as critical habitat for such species. Until such time, the DON requests that the USFWS provide the DON notification at the earliest opportunity of its intent to propose species for listing or habitat for designation as critical habitat. It is our hope that this early coordination will foster open communications and allow a smooth and speedy process in the event the USFWS proposes such listing or designation and conferral is required.

Per the Section 7(b)(1)(a), 50 CFR §402.12(j), and section 4.4(A) of the *ESA Consultation Handbook*, [Section 4.4 (A) *Timeframes for Formal Consultation*] we look forward to receiving confirmation of a complete and accurate consultation package within 30 days of receipt of this letter. The DON's consultation subject matter expert has

scheduled a meeting with your office on October 20, 2014, to discuss the enclosed Biological Assessment within 20 days of the date of this letter.

We look forward to working with you through the additional 60 day consultation period to discuss any concerns or issues you may have with the proposed action and its associated potential impacts to endangered and threatened species and critical habitat. The DON's technical point of contact is Ms. Coralie Cobb, Naval Facilities Engineering Command, Southwest. For technical questions, please contact her at (720) 542-3085 or email at coralie.cobb@navy.mil. If you have any questions regarding this request or would like a briefing on the proposed action please contact Mr. Randal Sablan, JGPO Environmental Director, at (671) 339-5440 or e-mail at randal.sablan@navy.mil.

Sincerely,

Joseph Ludovici
Principal Deputy
Acting

Enclosure: 1. Biological Assessment for the Re-Initiation of Consultation from the Proposed Military Relocation to Guam

Copy To:
DASN (E)
Joint Region Marianas
NAVFAC Marianas
NAVFAC Pacific
Marine Forces Pacific DPRI
HQMC (I&L), (PP&O)
CNO (N45)
CNIC (N45)
Headquarters, Pacific Air Forces
Headquarters, Naval Facilities Engineering Command

Biological Assessment for the Re-Initiation of Consultation regarding the Proposed Military Relocation to Guam

Prepared by:

Naval Facilities Engineering Command

Prepared for:

Joint Guam Program Office

Submitted to:

United States Fish and Wildlife Service

200 Ala Moana Blvd, Room 3-122, Box 50088

Honolulu, Hawaii 96850

1 October 2014

Acronyms and Abbreviations

ac	acre(s)
AAFB	Andersen Air Force Base
ACE	Air Combat Element
AFB	Air Force Base
AMC	Air Mobility Campus
APHIS	Animal and Plant Health Inspection Service
BA	Biological Assessment
BEQ	Bachelor Enlisted Quarters
BOQ	Bachelor Officer Quarters
BMP	Best Management Practice
BO	Biological Opinion
BTS	brown treesnake(s)
C	Construction
CATM	Combat Arms Training and Maintenance
CFR	Code of Federal Regulations
CLB	Combat Logistics Battalion
cm	centimeter(s)
CNMI	Commonwealth of the Northern Mariana Islands
COMNAV	Commander Navy Region
COMNAVMAR	Commander Navy Region Marianas
CWCS	Comprehensive Wildlife Conservation Strategy
DAWR	Guam Department of Aquatic and Wildlife Resources
Dbh	diameter breast height
dBs	decibels
DFW	CNMI Division of Fish and Wildlife
DNL	day-night average sound level
DoD	Department of Defense
DON	Department of the Navy
DSEIS	Draft Supplemental Environmental Impact Statement
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENCL	Enclosure
EOD	Explosive Ordnance Detachment
ERA	Ecological Reserve Area
ESA	Endangered Species Act
ESB	Engineer Support Battalion
ESQD	Explosive Safety Quantity Distance
FAA	Federal Aviation Administration
ft	foot/feet
ft^2	square foot/feet
FY	fiscal year
g	gram(s)
GIS	Geographic Information Systems
GovGuam	Government of Guam
GNWR	Guam National Wildlife Refuge
GWA	Guam Water Authority
HACCP	Hazard Analysis and Critical Control Point
ha	hectare(s)
HG	Hand Grenade
HMU	Habitat Management Unit
HQ	Headquarters
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
ISR	Intelligence, Surveillance, and Reconnaissance
JGPO	Joint Guam Program Office
JRM	Joint Region Marianas
KD	known distance
km	kilometer(s)
km^2	square kilometer(s)
kV	kilovolt
lb	pound(s)
LFTRC	Live-Fire Training Range Complex
m	meter(s)
m^2	square meter(s)
mm	millimeter(s)
MCO	Marine Corps Order
MEC	Munitions and Explosives of Concern
MEF	Marine Expeditionary Force
MEU	Marine Expeditionary Unit
mi	mile(s)
mi^2	square mile(s)
min	minute(s)
MIRC	Mariana Islands Range Complex
MLLW	mean lower low water
MOA	Memorandum of Agreement
MPMG	Multi-Purpose Machine Gun
MSA	Munitions Storage Area
MWDK	Military Working Dog Kennel
NAVFAC	Naval Facilities Engineering Command
NBG	Naval Base Guam
NCTS	Naval Computer and Telecommunication Site
NDAA	National Defense Authorization Act
NDWWTP	Northern District Wastewater Treatment Plant
NISC	National Invasive Species Council
NMFS	National Marine Fisheries Service
NMS	Naval Munitions Site
NPDES	National Pollutant Discharge Elimination System
NSSA	Non-standard Small Arms
NWF	Northwest Field
NWRC	National Wildlife Research Center
OEIS	Overseas Environmental Impact Statement
OPNAVINST	Chief of Naval Operations Instruction
Ops	operations
oz	ounce(s)
PCE	Primary Constituent Elements
PCS	Permanent Change of Station
POV	privately-owned vehicle
PSA	Public Service Announcement
ROD	Record of Decision
RBP	Regional Biosecurity Plan
SCC	Security Consultative Committee
SEIS	Supplemental Environmental Impact Statement
SDZ	Surface Danger Zone
SOGCN	Species of Greatest Conation Need
UDP	Unit Deployment Program
U&SI	Utilities and Site Improvements
UoG	University of Guam
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USMC	U.S. Marine Corps
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
yd	

EXECUTIVE SUMMARY

On September 8, 2010, the United States Fish and Wildlife Service (USFWS) issued its Biological Opinion (BO) (2010-F-0122) for the relocation of certain elements of the U.S. Marine Corps (USMC) from Okinawa to Guam (as outlined in the May 2006 Realignment Roadmap). The BO addressed the preferred alternative in the Final Environmental Impact Statement (FEIS) for the ‘‘Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force,’’ dated July 2010. A Record of Decision (ROD) for the FEIS was signed on September 20, 2010 (75 FR 60438, September 30, 2010). The 2010 ROD deferred a decision on the location of a live-fire training range complex (LFTRC).

The Department of the Navy (DON) made adjustments with regards to the LFTRC and initially elected to prepare a Supplemental Environmental Impact Statement (SEIS) limited solely to the evaluation of impacts associated with the location, construction, and operation of the LFTRC (77 FR 6787, February 9, 2012). However, on April 27, 2012, the U.S.-Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap (Ministry of Foreign Affairs 2012). In accordance with the SCC’s adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially smaller force on Guam. Specifically, the adjustments include reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents on Guam. That decision prompted the DON’s review of the actions previously planned for Guam and approved in the ROD and addressed in the BO. This review concluded that while some actions remain unchanged as a result of the smaller force size, others, such as the main cantonment and family housing areas, could significantly change as a result of the modified force. The DON has opted to address these changes in a Supplemental Environmental Impact Statement (SEIS) (77 FR 61746, October 11, 2012) and this Biological Assessment (BA). The BA addresses the DON's preferred alternative in the SEIS which is to build and operate a main cantonment at Finegayan, housing on Andersen Air Force Base (AAFB), and a live fire training range complex at AAFB, Northwest Field (NWF).

The proposed reduction in the size of the new force structure does not affect all of the decisions that were made in the 2010 ROD. The potential environmental effects of these actions were fully and accurately considered and analyzed in the 2010 FEIS. For example, the relocation of the Marine Corps Aviation Combat Element facilities to AAFB, the development of the North Gate and access road at AAFB, Apra Harbor wharf improvements, and the non-live-fire training ranges on Andersen South and Naval Munitions Site (NMS) remain unaffected by the changes in force structure resulting from the 2012 Roadmap adjustments. These actions will occur no matter where on Guam the main cantonment, family housing areas and live-fire training range complex are situated. For those decisions that are not affected by the new force structure, the 2010 ROD stands as the final agency action for those elements.

The expanded scope of the SEIS does not include the transient aircraft carrier berthing in Apra Harbor, the establishment of training ranges on Tinian, and the Army Air and Missile Defense Task Force.

This BA is comprehensive and addresses all actions associated with the USMC relocation to Guam. The DON has prepared this BA to re-analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS from the actions addressed in the SEIS and DON actions addressed in the ROD that are not affected by the new force structure.

Based on the evaluation presented in this BA, the DON has made the following determinations (Table ES-1).

Table ES-1. Threatened and Endangered Species Addressed in this BA and Their Affects Determinations

Common Name	Scientific Name	ESA Status	Affects Determination	Critical Habitat
Mariana fruit bat	Pteropus mariannus mariannus	Threatened	Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Mariana crow	Corvus kubaryi	Endangered	Likely to Adversely Affect (habitat only)	May Affect, Not Likely to Adversely Affect
Guam rail	Gallirallus owstoni	Endangered	Likely to Adversely Affect (habitat only)	Not applicable
Guam Micronesian kingfisher	Todiramphus [=Halcyon] cinnamominus cinnamominus	Endangered	Likely to Adversely Affect (habitat only)	May Affect, Not Likely to Adversely Affect
Green sea turtle	Chelonia mydas	Threatened	May Affect, Not Likely to Adversely Affect	Not applicable
Hawksbill sea turtle	Eretmochelys imbricata	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Hayun lagu	Serianthes nelsonii	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Mariana gray swiftlet	Aerodramus vanikorensis bartschi	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable

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CHAPTER 1
INTRODUCTION

On September 8, 2010, the USFWS issued its Biological Opinion (BO) (2010-F-0122) for the Joint Guam Program Office (JGPO) Relocation of the USMC from Okinawa to Guam (as outlined in the May 2006 Realignment Roadmap). The BO addressed the preferred alternative in the Final Environmental Impact Statement (FEIS) for the ''Guam and Commonwealth of the Northern Mariana Islands Military Relocation; Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force,'' dated July 2010.

A Record of Decision (ROD) for the FEIS was signed on September 20, 2010 (75 FR 60438, September 30, 2010) in which the Department of the Navy (DON) deferred a decision on the location of a live-fire training range complex (LFTRC). In the months following the issuance of the ROD, the DON made adjustments with regards to the LFTRC, including application of a probabilistic methodology for determining firing range surface danger zones that reduced the overall footprint of the Multi-Purpose Machine Gun (MPMG) range. The DON initially elected to prepare a Supplemental Environmental Impact Statement (SEIS) limited solely to the evaluation of impacts associated with the location, construction, and operation of the LFTRC (77 FR 6787, February 9, 2012). However, on April 27, 2012, the U.S.-Japan Security Consultative Committee (SCC) issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Realignment Roadmap. In accordance with the SCC's adjustments, the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially smaller force on Guam. Specifically, the adjustments include reducing the originally planned relocation of approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents on Guam (Figure 1-1). That decision prompted the DON's review of the major actions previously planned for Guam and approved in the 2010 ROD and addressed in the 2010 BO. This review concluded that while some actions remain unchanged as a result of the smaller force size, others, such as the main cantonment and family housing area, could significantly change as a result of the modified force (Figure 1-1). The DON has opted to address these changes in an SEIS (77 FR 61746, October 11, 2012) and this Biological Assessment (BA). This BA addresses the DON's preferred alternative which is to build and operate a main cantonment at Finegayan, family housing at Andersen Air Force Base (AAFB) and a live fire training complex range at AAFB, Northwest Field (NWF) (Table 1-1).

As discussed above, the proposed reduction in the size of the new force structure does not affect all of the decisions that were made in the ROD. The relocation of the USMC Aviation Combat Element facilities to AAFB, the development of the North Gate and access road at AAFB, Apra Harbor wharf improvements, and the non-live-fire training ranges on Andersen South and NMS remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments (Table 1-1). These actions will occur no matter where on Guam the main cantonment, family housing and LFTRC are situated. The potential environmental effects of these actions were fully and accurately considered and analyzed in the FEIS. For those decisions that are not affected by the new force structure, the 2010 ROD stands as the final agency action for those elements.

The scope of the SEIS does not include the transient aircraft carrier berthing in Apra Harbor, the establishment of training ranges on Tinian, and the Army Air and Missile Defense Task Force.

This BA is comprehensive and addresses all actions associated with the USMC relocation to Guam.

Figure 1-1. Key Differences Between 2010 Final EIS and 2014 Draft SEIS

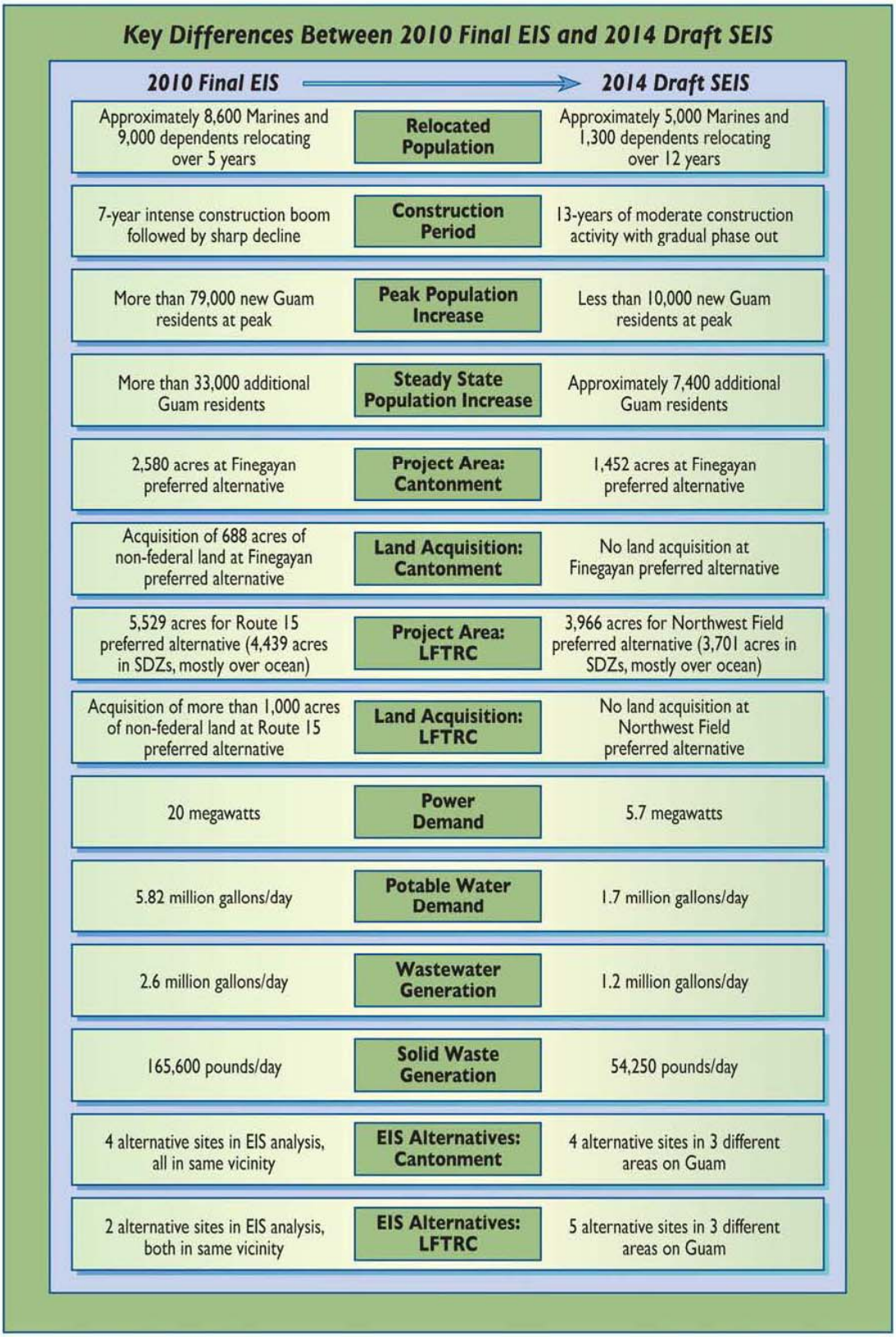

Table 1-1. DON Actions Associated with the Military Relocation to Guam

Location	Action (Status)
Finegayan	Utilities and Site Improvements (U&SI), Phase I – Main cantonment
Finegayan	Utilities and Site Improvements (U&SI), Phase II - Main cantonment
AAFB	Family Housing
Northwest Field (NWF)	Live-Fire Training Range Complex - KD ranges
NWF	Live-Fire Training Range Complex - MPMG range
Andersen South	Hand Grenade Range
Finegayan, other existing bases, NWF, and Andersen South	Information Technology/Communications
AAFB	Well Field and Associated AAFB Distribution System
Route 3, 3A and 9	Off-Base Utilities (Water, Sewer and Electrical)
AAFB	Location for the Marine Corps Air Combat Element and construction of associated facilities at AAFB North Ramp (Parking Apron and Utilities Under Construction)
AAFB	Construction of air embarkation facilities at AAFB South Ramp (Air Freight Terminal Complex Under Construction)
AAFB	Construction of the North Gate and access road at AAFB, including a new Entry Control Point facility (Under Construction)
Andersen South	Development of a training range complex to include maneuver training and landing zones (Under Design)
Apra Harbor	Waterfront functions at Apra Harbor to support embarkation, including wharf and utility upgrades, and associated berth dredging and dredge disposal management (Uniform and Tango Wharf Improvements and Apra Harbor U&SI Under Construction)
Apra Harbor	Relocation of Military Working Dog Kennel (Under Construction)
Apra Harbor	Relocation of U.S. Coast Guard (Future Project)
Apra Harbor	New Medical Clinic (Future Project)
Apra Harbor	Apra Harbor Embark Operations (Future Project)
Naval Munitions Site	Training activities, including aviation training and nonfiring operations training (Future Project)
Naval Munitions Site	Access to the NAVMAG area using the existing hiking trail as the access road (No Construction Required)
Naval Munitions Site	Use of Parsons Road area for the location of additional ammunition storage at NAVMAG (Future Project)
Utility Projects	Installation of disinfection and treatment water system, water tank, booster pumps, emergency generator, and transmission facilities required to provide potable water supply. Well Repair project proposes to restore the well facilities back into service to support the immediate water demand from the military build-up. (Completed)
Roadway Project (by FHWA and Guam Department of Public Works[GDPW])	Route 1 and Route 8 intersection and improvement (Hagåtña) ("Guam Road Network" [GRN]1) – (Part of Hagåtña Bridge Replacement Project Scope, Under Construction)
Roadway Project(s)	Route 1 and Route 3 intersection and roadway improvements (Dededo) (GRN2) – (On Hold)
Roadway Project	Replacement of Hagåtña (Agaña) Bridge #1 with reinforced concrete (GRN3) – (Under Construction)
Roadway Project	Route 11 roadway improvements from the port to Route 1, including pavement strengthening (GRN4) – (Completed)
Roadway Project	Widening of the Route 1 and Route 11 intersection, adding a second left turn lane and pavement strengthening (GRN5) – (Completed)

FSEIS 2014 Preferred Alternative

2010 ROD Retained Actions

1.1 BACKGROUND

The 2010 BO concluded that after reviewing the current status of the listed species, the environmental baseline, the effects of the Proposed Action and the cumulative effects, the action, as proposed, was not likely to jeopardize the continued existence of the Guam Micronesian kingfisher, Guam rail, Mariana common moorhen, Mariana crow, and Mariana fruit bat.

The 2010 BO anticipated incidental take may occur to the Mariana common moorhen and the Mariana fruit bat as a result of the Proposed Action. The incidental take was for the following species and actions:

1) Four Mariana common moorhens may be incidentally taken in the form of harassment on days when construction and live-fire exercises occur at the proposed Tinian firing ranges.
2) Up to ten remaining Mariana fruit bats at the Pati Point natural area colony will be taken in the form of harassment due to loud aircraft noise resulting from the Project Description.

To date, no incidental take associated with the 2010 Project Description has occurred as no work was initiated on Tinian and no loud aircraft noise has occurred due to the delay in the relocation of USMC personnel.

In 2011, the DON requested to amend the 2010 BO to address a reduction in the amount and pace of construction. The USFWS's response recognized the need to delay implementation of certain conservation measures outlined in the BO.

In September of 2012, the DON notified the USFWS of its intention to request a second amendment to the BO due to changes in the overall project description tied to an adjustment of the United States' agreement with Japan and congressionally mandated conditions restricting the DON's ability to expend funds to implement the military relocation to Guam, including those funds necessary to implement various conservation measures. On October 12, 2012, the USFWS stated that a re-initiation request and BA (versus an amendment to the BO) were necessary to address the changes in the project description.

In April of 2013, the DON submitted a BA with the conclusion that the interim actions (i.e., those actions not affected by the 2012 Roadmap Adjustments) were "not likely to adversely affect" the Mariana fruit bat. Consistent with Department of Interior and USFWS published guidance, the DON's request for re-initiation focused only on those extant species currently physically present on Guam and did not include those species extirpated from Guam. While the USFWS acknowledged that current regulations and published USFWS guidance do not specifically address extirpated species, the USFWS advised the DON that consultation on effects to currently extirpated species is not unprecedented and is appropriate in this instance as the effects of the Proposed Action are likely to persist and overlap the period when reintroduction of the currently extirpated species on Guam is reasonably certain to occur and the species are likely to be exposed to the effects of the Proposed Action should it be implemented. Reintroduction of the any of the species on Guam will require the USFWS to develop a reintroduction plan and comply with the legal requirements of the National Environmental Policy Act and the Endangered Species Act. The DON will actively participate in recovery committees for endangered or threatened species on Guam and in the Marianas, and will work with the USFWS to develop a reintroduction plan and associated environmental planning and compliance documentation that ensures such reintroduction efforts are consistent with the species recovery plans and recognizes the long-term military mission on Guam.

Due to the amount of time it took to resolve the issues regarding extirpated species, the DON rescinded the 2013 BA and has prepared this BA to re-analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS from the actions addressed in the Final SEIS and the DON actions addressed in the ROD that are not affected by the April 2012 SCC joint statement.

On September 10, 2013, in anticipation of the Section 7 consultation for the SEIS, the DON sent a request to the USFWS for concurrence on the list of federally listed species and designated critical habitat present within the U.S. Territory of Guam. The USFWS responded on September 20, 2013 with a species list (Table 1-2). The DON has prepared this BA to re-analyze the potential impacts on federally listed threatened and endangered species under the jurisdiction of the USFWS for all the DON actions associated with the USMC relocation to Guam (Table 1-3).

Table 1-2. USFWS Species List for the Guam and Commonwealth of the Northern Marianas Islands (Tinian) Military Relocation

Common Name	Scientific Name	ESA Listing Status	Islands
Hayun lagu	*Serianthes nelsonii*	Endangered	Guam
Mariana fruit bat*	*Pteropus mariannus mariannus*	Threatened	Guam, Tinian
Mariana crow*	*Corvus kubaryi*	Endangered	Guam[1]
Mariana common moorhen	*Gallinula chloropus guami*	Endangered	Guam, Tinian
Guam rail	*Gallirallus owstoni*	Endangered	Guam[1]
Micronesian megapode	*Megapodius laperouse*	Endangered	Tinian
Guam Micronesian kingfisher*	*Todiramphus cinnamominus cinnamominus*	Endangered	Guam[1]
Mariana gray swiftlet	*Aerodramus vanikorensis bartschi*	Endangered	Guam
Green sea turtle[2]	*Chelonia mydas*	Threatened	Guam, Tinian
Hawksbill sea turtle[2]	*Eretmochelys imbricate*	Endangered	Guam, Tinian

*Critical habitat for the Mariana fruit bat, Mariana crow, and Guam Micronesian kingfisher has been designated on the Guam National Wildlife Refuge.
[1]Extirpated in the wild on Guam. Sufficient habitat is needed for recovery which includes the re-establishment of these species in the wild on Guam.
[2]Only includes species utilizing terrestrial resources (e.g., turtle nesting on beaches).

1.2 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action in the SEIS is to ensure that the relocated Marines are organized, trained, and equipped as mandated by 10 USC §5063 to satisfy individual live-fire training requirements as described in the 2010 Final EIS and associated ROD, and to establish an operational USMC presence on Guam in accordance with the 2012 Roadmap Adjustments. The purpose remains unchanged from the 2010 Final EIS, albeit to support a materially smaller relocating USMC force (Figure 1-1).

For a more detailed discussion of the purpose of and need for the Proposed Action, please refer to the:

- 2010 FEIS, Chapter 1, Volume 1 (Overview of Proposed Action and Alternatives); and

- 2014 Final SEIS, Chapter 1 - Purpose of and Need for the Proposed Action

After receipt of several regulatory agency and public comments on the Draft SEIS requesting the DON explore additional means to minimize the loss of vegetation and habitat necessary to support the recovery of federally-listed threatened and endangered species on Guam, the DON has decided to create an alternative that moves the preferred housing location from Finegayan to AAFB. This change reduces the impacts to recovery habitat for the Mariana crow, Guam Micronesian kingfisher and Mariana fruit bat by approximately 305 acres. The new alternative, which the DON has identified as its preferred alternative in the SEIS, is essentially a combination of the main cantonment already analyzed under Alternative B and the family housing analyzed under Alternative D in the Draft SEIS. This new alternative, Alternative E, is comprised of the main cantonment at Finegayan, family housing at AAFB, and the LFTRC at AAFB-NWF. This new preferred alternative will be identified as such and analyzed in the Final SEIS. The purpose and need and core description of the Proposed Action has not changed.

1.3 SPECIES ADDRESSED IN THIS BA

Section 7(a)(2) of the Endangered Species Act (ESA) states, "Each Federal agency shall, in consultation with and with the assistance of the Secretary of the Interior, insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species." To "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. [50 CFR §402.02]

The threatened, endangered or extirpated species that may be within the Action Area of the actions covered in the scope of this BA are listed below in Table 1-3.

Table 1-3. Species Addressed in the BA

Common Name	Scientific Name	ESA Listing Status
Hayun lagu	*Serianthes nelsonii*	Endangered
Mariana fruit bat	*Pteropus mariannus mariannus*	Threatened
Mariana crow[1]	*Corvus kubaryi*	Endangered
Guam rail[1]	*Gallirallus owstoni*	Endangered
Guam Micronesian kingfisher[1]	*Todiramphus cinnamominus cinnamominus*	Endangered
Mariana gray swiftlet	*Aerodramus vanikorensis bartschi*	Endangered
Green sea turtle	*Chelonia mydas*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricate*	Endangered

[1]Extirpated in the wild on Guam. Habitat suitable for the recovery of the species is available on Guam.

1.4 SPECIES ELIMINATED FROM DETAILED ANALYSIS

In a September 20, 2013 letter, the USFWS identified 10 species as species "that may be affected by your proposed project." Two of those species have been excluded from analysis within this BA because either: (1) the DON has determined that the revised Project Description will not affect the species or (2) the species are not present in the Action Area (Table 1-4).

Table 1-4. Species Eliminated from Analysis in this Biological Assessment

Common Name	Scientific Name	ESA Listing Status	Islands
Mariana common moorhen	*Gallinula chloropus guami*	Endangered	Guam, Tinian
Micronesian megapode	*Megapodius laperouse*	Endangered	Tinian

The Mariana common moorhen and Micronesian megapode are listed as endangered and occur on Guam and Tinian, however, the DON has determined that the Project Description will not affect these species and they are excluded from analysis within this BA. The DON has reached this conclusion because activities addressed in this BA are not sufficiently proximate to the Mariana common moorhen to directly or indirectly affect any individuals. The Micronesian megapode is excluded from analysis because they are not found within the Action Area, Guam, instead they are found on Tinian. The Action Area no longer includes Tinian.

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CHAPTER 2
PROPOSED ACTION, BEST MANAGEMENT PRACTICES, AND CONSERVATION MEASURES

2.1 PROPOSED ACTION

The SEIS Proposed Action is to construct and operate a main cantonment area, including family housing, and a LFTRC on Guam to support the USMC relocation. These requirements include a main cantonment and family housing area of sufficient size and functional organization to accommodate the reduced number of Marines relocating to Guam per the 2012 Roadmap Adjustments, and an LFTRC that allows for simultaneous use of all of the firing ranges to support training and operations of the relocated Marines. The SEIS Proposed Action also includes the provision of on-site utilities, access roads, and related off-site infrastructure to support the main cantonment, family housing and LFTRC (Figure 2-1 and Table 1-1).

The Proposed Action in this BA includes those decisions that were made in the 2010 ROD that remain unaffected by the changes in force structure resulting from the April 2012 Roadmap adjustments and the Preferred Alternative as described in the 2014 Final SEIS (Figure 2-1). As part of the National Environmental Policy Act environmental planning process, the DON held public meetings to allow for public and regulatory agencies to comment on the Proposed Action. As a result, the DON received comments from both regulatory agencies and the public recommending the DON explore additional means to minimize the loss of vegetation and habitat necessary to support the recovery of federally-listed threatened and endangered species on Guam. In response to these recommendations, the DON has decided to create an alternative that moves the family housing from Finegayan to AAFB, while maintaining the main cantonment at Finegayan. This new alternative, which the DON has identified as its new preferred alternative, is essentially a combination of the main cantonment already analyzed under Alternative B and the family housing analyzed under Alternative D in the Draft SEIS. This alternative moves the preferred housing location from an undeveloped area to an area that is already developed as family housing, thus avoiding the impacts to the habitat present in the southern portion of Finegayan. Additionally, locating the housing at AAFB will provide the opportunity to share services such as the commissary and exchange, resulting in a long term cost savings to the DoD. The new preferred alternative with the main cantonment at Finegayan and family housing at AAFB will be included in the Final SEIS as Alternative E and is used as the Proposed Action in this BA.

2.2 MILITARY RELOCATION CONSTRUCTION PROJECTS

Implementation of the Proposed Action includes over 130 separate construction projects (Appendix A). The projects include both horizontal construction (e.g., clearing, grading, and utilities) and vertical construction (e.g., building construction). In some instances, the horizontal construction will happen well in advance of the vertical construction.

The approximate acreage of impacts to recovery habitat associated with the various elements of the Proposed Action are calculated in Table 2-1.

Figure 2-1. FEIS Alternative "E" Project Footprint and 2010 ROD Retained Actions

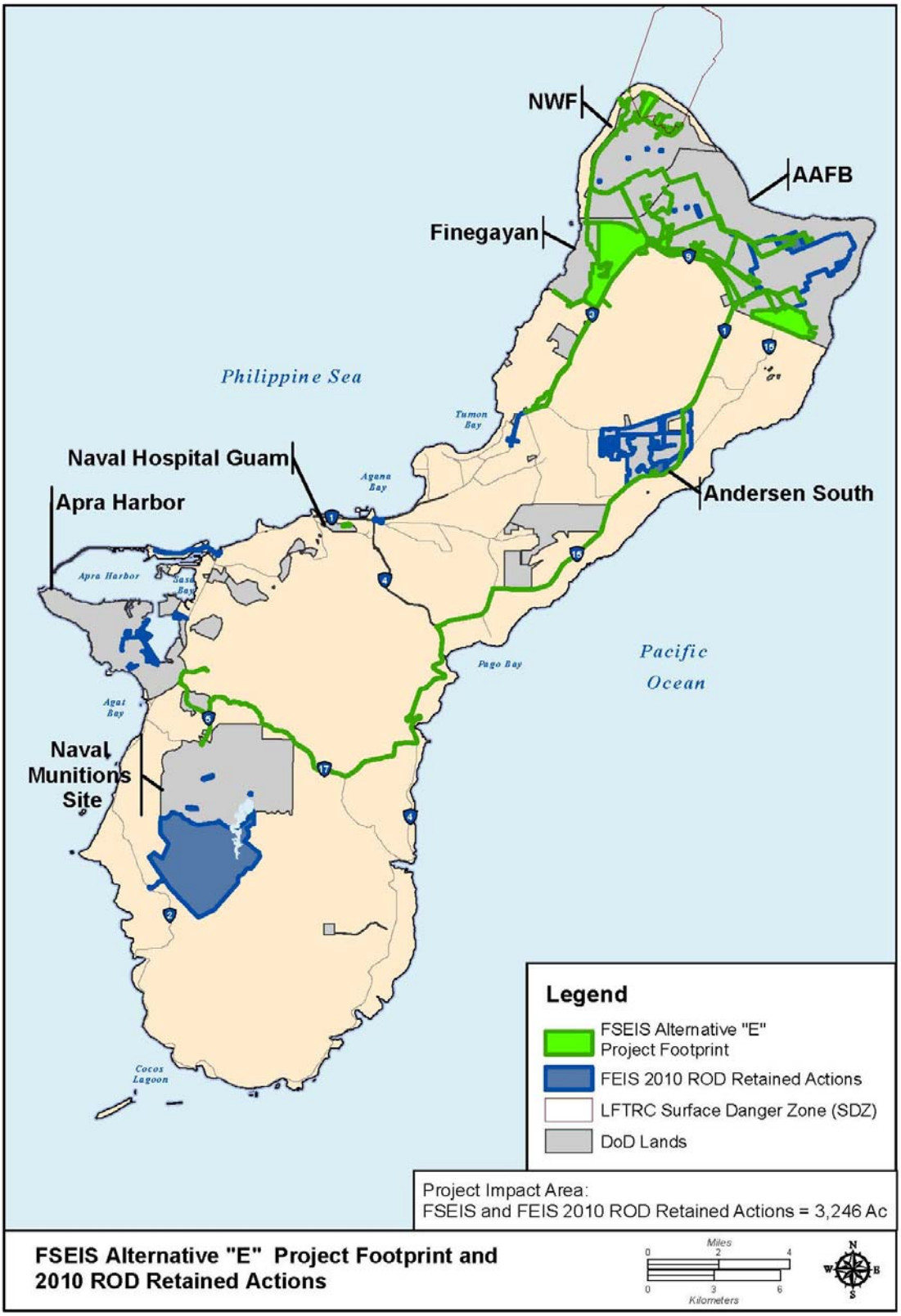


Table 2-1. Proposed Action and Associated Impacts to Recovery Habitat

FEIS 2010 ROD Related Actions and DSEIS 2014 Project Areas		Serianthes nelsonii Recovery Habitat (Ac)	Mariana Crow Recovery Habitat (Ac)	Guam Rail Recovery Habitat (Ac)	Mariana Fruit Bat & Guam Micronesian Kingsfisher Recovery
Project Name	Overlap - Project Name				
FEIS 2010 ROD Related Actions		48.40	75.61	382.93	71.84
Cantonment U&SI Phase I		334.52	336.95	192.73	336.95
Cantonment U&SI Phase II		106.84	106.80	66.34	106.80
Family Housing at AAFB		10.84	10.84	39.73	8.18
Information Technology/Communications		18.51	23.66	96.86	23.46
Electrical, Wastewater, and Water Off Site Utilities		18.79	29.94	67.65	28.35
Water Well Development Area		90.00	90.00	90.00	90.00
Live Fire Training Range Complex - MPMG		62.63	80.50	27.05	80.50
Live Fire Training Range Complex - KD Ranges		115.99	134.78	45.96	134.04
Live Fire Training Range Complex - USFWS Relocation		2.88	13.04	0.00	14.42
AAFB - Expand Middle School		0.00	0.00	0.00	0.00
Guam High School Expansion		0.00	0.00	2.08	0.00
MC&FH Finegayan Blue Box Area Outside U&SI Projects		138.31	197.32	144.42	197.32
Footprints		**933**	**1072**	**1071**	**1065**

Data Sources: SEIS Blue Box Boundaries Version 5; SEIS Green Boxes Version 1; MC&FH Finegayan CDP (12/19/2013); LFTRC Northwest Field CDP (11/27/13); Andersen South Training Site Plan 4(/2014); Guam Rainbow Chart 3/17/2014
Water Well Development Area - Water Well and Water Lines/Access Roads are Notional, up to 90Ac of Impact

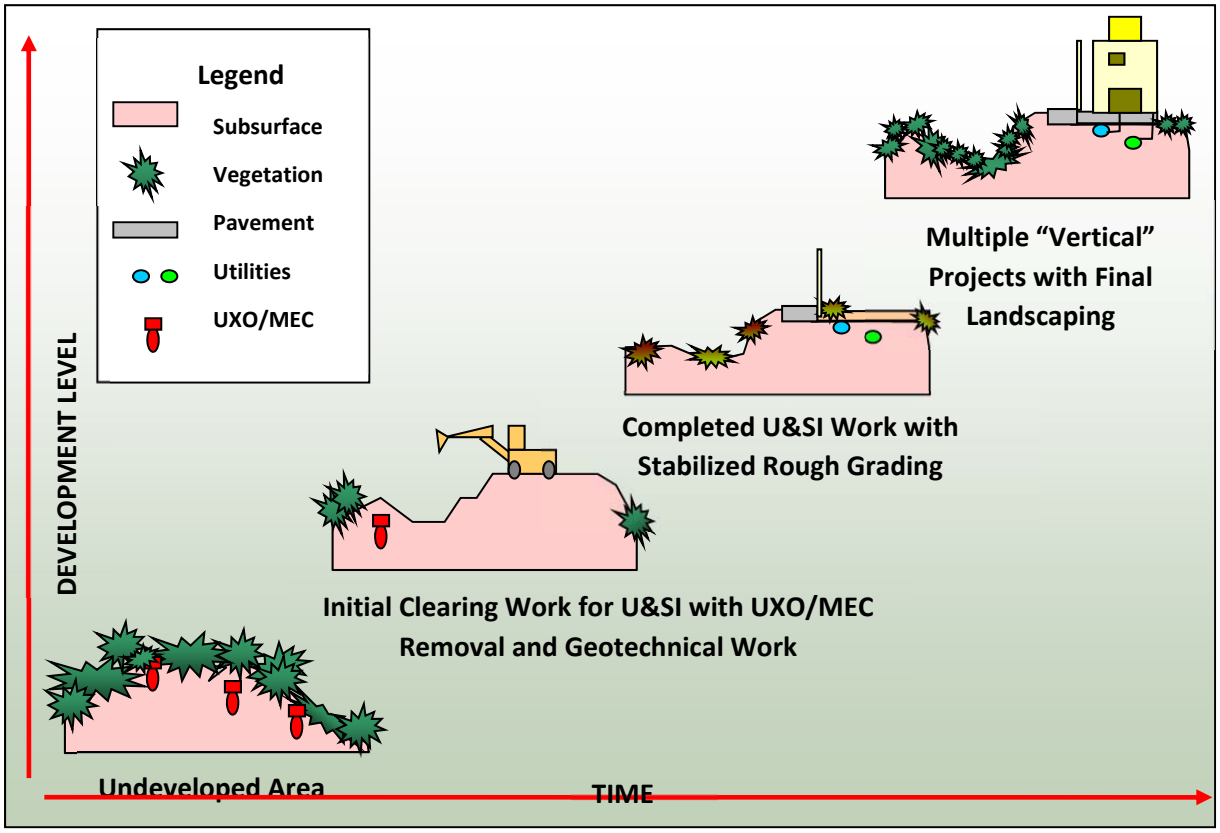
2.2.1 Utilities and Site Improvements (U&SI)

The geographic limits of a development area, particularly the main cantonment and family housing, will coincide with the footprint of horizontal construction work referred to as "Utilities and Site Improvements" (U&SI). Virtually all vegetation clearing and the bulk of ground disturbance are performed during preparatory horizontal construction work (including initial "intrusive" design activities and clearing of unexploded ordnance and munitions and explosives of concern (UXO/MEC)). The U&SI, as its name implies, basically provides the foundation or backbone transportation, utility and ground surface improvements to prepare the area for future vertical construction and tie-in of individual facilities and utilities.

There are three U&SI projects (Phases 1 and 2 of the main cantonment and family housing). Figure 2-2 illustrates the chronology of a large construction project over time, displaying the timing of horizontal and vertical construction.

The U&SI project scope includes clearing, grubbing, grading, earthwork (such as digging, trenching, drilling, boring and/or cut and fill), processing and stockpiling of green waste, erosion and sediment control, roadways, sidewalks, curbs and gutters, traffic signs, temporary construction fence, perimeter/security fence, landscaping and other site improvements. An electrical substation, underground electrical distribution, telecommunications conduit and cabling, mechanical utilities (water transmission main and sanitary sewer) will also be constructed. Additionally, the effort may require removal of MEC, seismic fault, geotechnical/geophysical and/or topographic surveys in preparation for improvements and future construction projects within the area.

Figure 2-2. Phasing of Horizontal (U&SI) and Vertical Work for Large Development Areas



A wastewater collection system including a wastewater pump (lift) stations and manholes would be installed. The new wastewater collection system would be installed underground with a minimum 3 feet (ft) to 5 ft of cover, or sometimes deeper if needed. The width of the installation trench would be approximately 2 ft to 4 ft wide. Larger excavations would be required for the installation of manholes and a wastewater pump station.

The same work to establish interconnectivity to and use of existing utility infrastructure will apply to power transmission and telecommunications infrastructure; it will also require new equipment, transmission and distribution lines, substations and standby power generation. Trench excavations required for all utilities will be similar in depth to wastewater and water lines, but may need adjustments based on conflicts or separation requirements.

Potable water demand will be addressed by additional supply from the proposed AAFB well field and existing DoD water system. The current water system serving existing facilities in Finegayan would generally remain in service. Interconnections between the proposed water system and the existing water system would be provided for redundancy and operational efficiency. Depth of excavations will be similar in nature to the wastewater collection system.

Site Preparation

Clearing and Grubbing: The U&SI projects require removal of vegetation, stripping limestone rock, and removal and stockpiling of reusable topsoil. This site work preparation will occur prior to mass grading of the site.

Grading and Earthwork: The U&SI work includes major earth moving (mass grading) and limited fine grading along the roadway corridors and drainage systems. The cut and fill quantities associated with this mass grading effort assume a rough building pad for future vertical construction, which anticipates further import of structural fill material. The cut and fill quantities also assume a 2 ft deep typical road pavement section including compacted base and pavement surfacing. Grading for clear zone at perimeter security fence is included.

The cut and fill quantities are based on the assumption that native material excavated on site is suitable for reuse as fill material. If soil testing and/or geotechnical recommendations indicate otherwise changes in grading or importation of material may be required. Contractors are 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 certificate, and certificate of origin. Treatment (disinfection) must be conducted at the point of origin.

Beneficial Reuse and Recycling Facility: Green waste processing and construction and demolition (C&D) debris generated during construction will be handled by contractors at designated laydown areas. Contractors will be required to divert all the green waste and a minimum of 50% of the C&D waste. The larger-sized green waste consisting of trees and stumps will be processed into mulch and the smaller sized green waste will be processed into compost. The C&D debris will mainly consist of concrete that will be crushed and used as lower-graded aggregate. The C&D waste not able to be diverted will be transported to the Naval Base Guam (NBG) Landfill, or to one of the two permitted private hardfill facilities in Yigo (Eddie Cruz and Primos Northern Hardfill).

Fencing

Perimeter Fence: An approximately 8,500 m (27,900 ft) long security fence (the exact length will be determined during design) will be constructed around the main cantonment perimeter. In accordance with Marine Corps Order 5530.1A, a 15 ft wide gravel perimeter road will be constructed on the inside of the fence line, and a 20 ft clear zone will be provided on the outside of the fence line.

Electrical Utilities

Electrical Substation: A main substation equipped with two 15 megavolt ampere, 34.5 kV – 13.8 kV transformers will be constructed in the main cantonment area, south of the main gate. Provisions will be made in the substation for primary line connections to the planned 34.5 kV underground line from the Harmon Substation and to the planned 34.5 kV line from AAFB. Switchgear space for future circuit breakers and empty conduit runs for future connections to the main substation will be provided. This space is to accommodate future connections that may be necessary to support and integrate the existing 13.8 kV critical circuits and existing 4.16 kV non-critical load on Finegayan.

Mechanical Utilities

Water Distribution: A new transmission main, to be installed by the well fields project, will convey water from the well field storage tank at AAFB to the boundary of the main cantonment area near the commercial/tactical vehicle gate. This project will construct a water pipeline from Route 3A near the commercial/tactical vehicle gate to the new two million gallon ground level water storage tank on Finegayan. The existing mains between some of the existing water wells on Finegayan will be demolished and realigned to the proposed roadways. The existing distribution mains servicing the abandoned Building 200 will also be removed. In the short term, the existing Finegayan water wells will

provide the USMC water distribution system with water. The long-term plan will provide the USMC water distribution system with water from both the existing Finegayan wells and the well fields system. This will provide an emergency backup for the water supply at AAFB be taken off line for maintenance or other reasons.

Sanitary Sewer: The existing DoD wastewater collection system within the main cantonment area at the Finegayan site consists of a trunk sewer serving Building 200 and connected to the GWA wastewater collection system through a GWA interceptor sewer along Route 3. Wastewater is conveyed to the Northern District Wastewater Treatment Plant (NDWWTP). Capacity evaluations of the existing collection system indicate the GWA interceptor sewer has adequate capacity for the project. The notional grading for the main cantonment area generally slopes downhill from north to south. A connection to the existing GWA interceptor sewer main along Route 3 is included.

2.2.2 Main Cantonment

The limits of a main cantonment development coincide with the footprint of U&SI horizontal construction work with the following exceptions: 9th Engineer Support Battalion (ESB) Headquarters (HQ) and 9th ESB, recycle/transfer station, utilities distribution/transmission projects external to U&SI PH1, PH2, and family housing (Figures 2-3 and 2-4). These project areas are accounted for in the impact analysis but the clearing and grading will not occur as part of the U&SI work.

The proposed main cantonment development includes essential base operations and support facilities and functions that are divided into the functional categories listed below, followed by examples of buildings/facilities for each. A complete list of base operations and support facilities is included in Appendix A.

1. Command Core - *Marine Expeditionary Brigade Headquarters (MEB HQ) and Command Buildings*

2. Unit Operations – *3rd MEB Command Element, 4th Marines, Ground Combat Element Infantry Battalion 1 and 2 (GCE – Inf Bn#1/2), Artillery Battery, Combat Logistics Battalion [CLB] -4, 9th Engineer Support Battalion (ESB) and Explosive Ordnance Disposal (EOD)*

3. Base Operations – *Base Administration, Fire Station, Public Works, Vehicle Fueling, Base Auto Shop, Kennel, Corrosion Prevention and Control, Security, etc.*

4. Bachelor Enlisted Quarters and Bachelor Officer Quarters (BEQs/BOQs)

5. Community Support – *Dining Facility, Fitness Center, Recreation Areas, Education Center, Auditorium/Theater, Branch Exchange, Bank/Credit Union, Food Court/Amusement Center, Medical/Dental Clinic, Post Office, etc.*

6. Training – *Battle Training Center, Individual Combat Skills Course, etc.*

These categories of main cantonment functions are generally consistent with those previously described in the Proposed Action for the 2010 FEIS Volume 2 Chapter 2.2 and 2010 BO; however, the relative size of the required cantonment area is considerably reduced given the smaller size and adjusted composition of the relocating force (i.e. a reduction from the original plan for approximately 8,600 Marines and 9,000 dependents to a force of approximately 5,000 Marines and 1,300 dependents).

Figure 2-3. Main Cantonment/Family Housing Alternative – FIN/AAFB

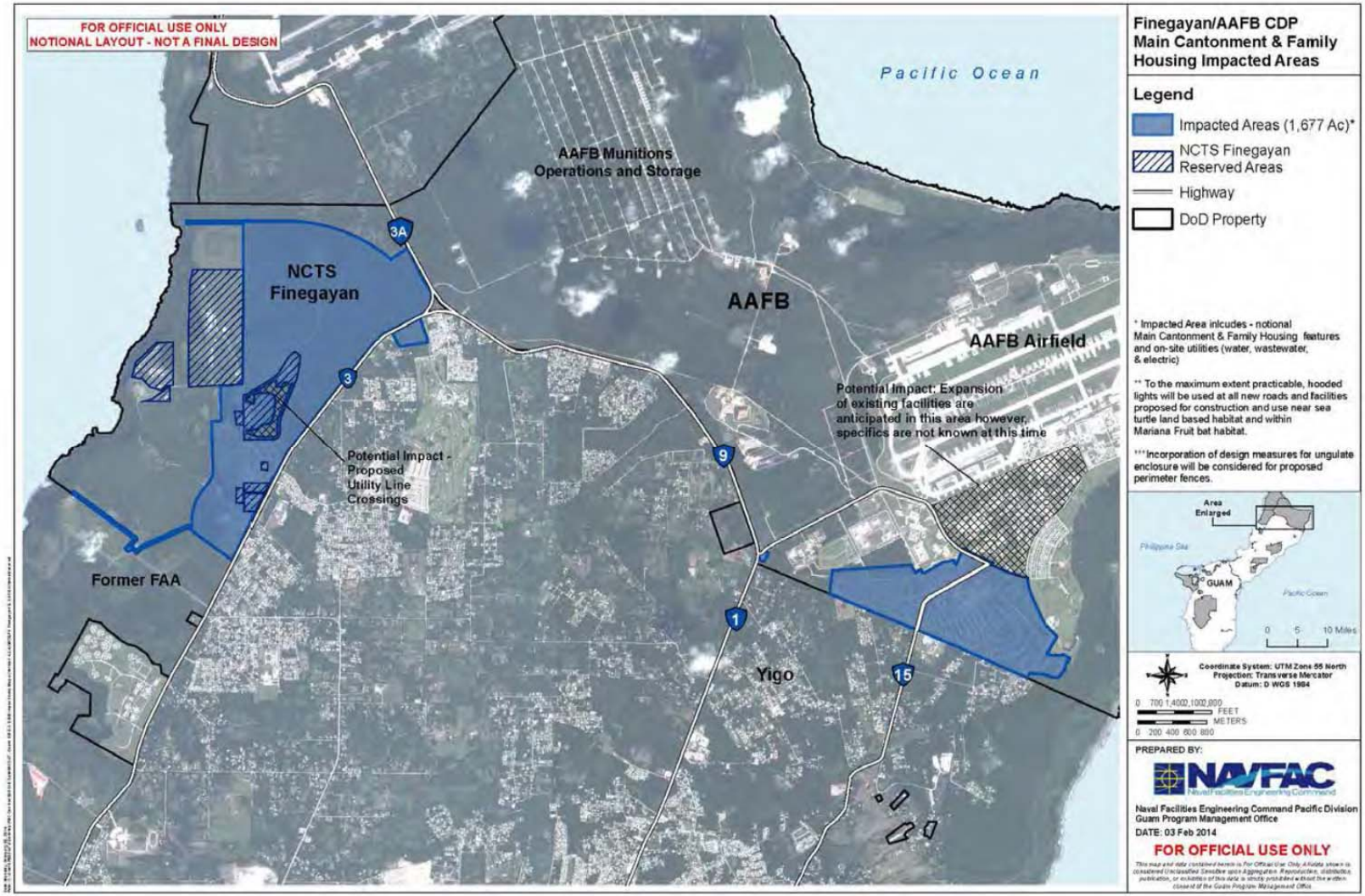
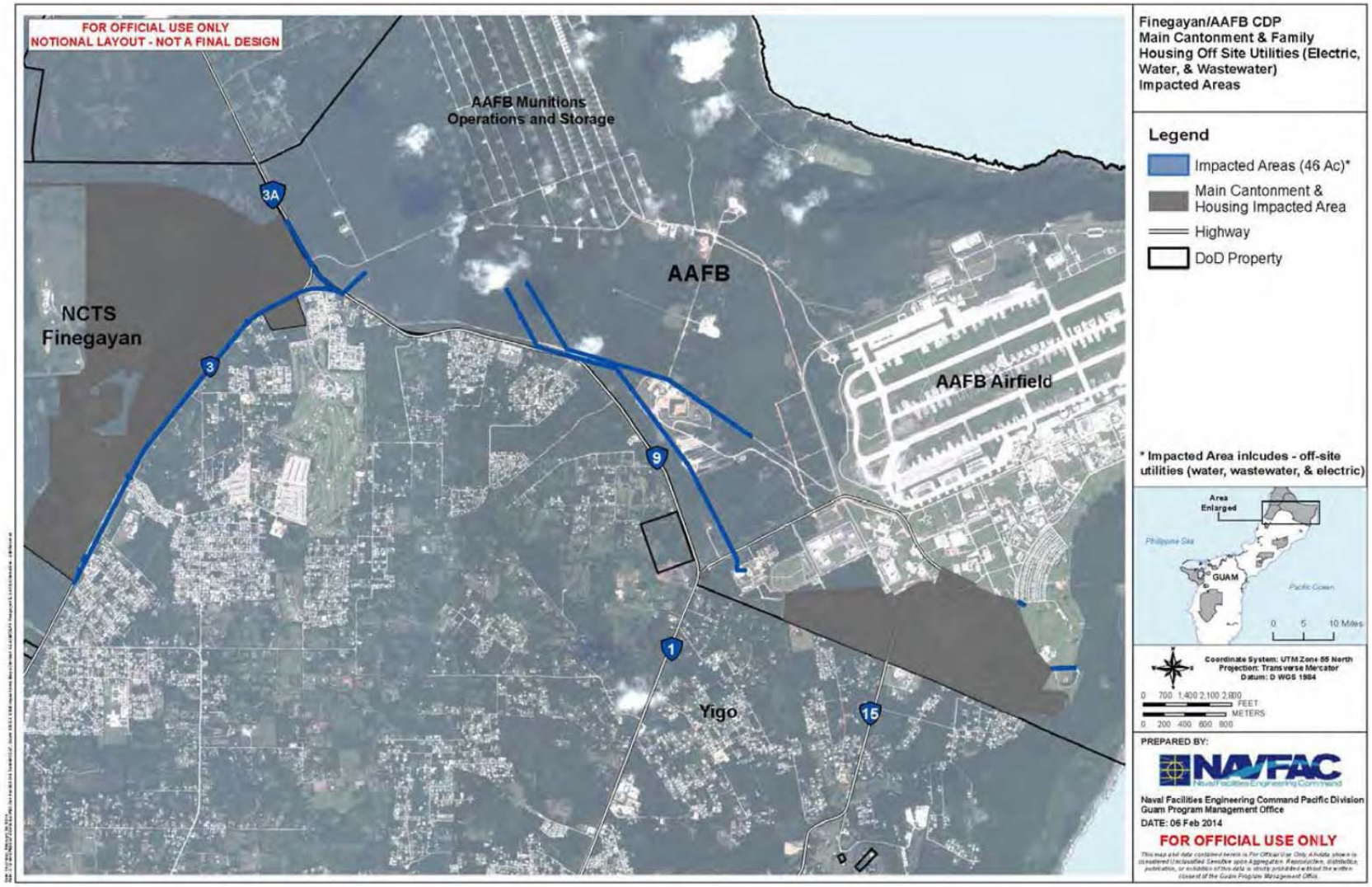


Figure 2-4. Main Cantonment/Family Housing Alternative – FIN/AAFB Utilities



Unit Operations and Base Operations will have the most intensive land use equivalent or similar to activities found in light industrial zoned areas. Activities in the Command Core, BEQ/BOQ, Community Support, and Training functions will have activities that are equivalent to residential or commercial zoned areas.

Individual projects for follow-on vertical work will be implemented in accordance with function-specific criteria pertaining to civil, architectural, structural, mechanical, electrical and other engineered features of work.

2.2.3 Family Housing

The proposed family housing development area is located on developed land on AAFB, which is bounded to the north and east by the Pacific Ocean, to the south by privately-owned residential areas, and to the west by Route 9 and NWF (Figures 2-3 and 2-4). Family housing includes residences for accompanied permanent Marines (referred to as Permanent Change of Station or PCS) and their dependents and family-oriented support and recreational facilities. Unaccompanied Marines (usually "rotational" or part of the Unit Deployment Program or UDP) would stay at the main cantonment BEQs/BOQs during their shorter-term (approximately 6 months) assignment to Guam.

The family housing area would be located at the current AAFB family housing area. The proposed housing density at AAFB is 5.5 units per acre. The family housing area would be accessed by the existing family housing gate (the Santa Rosa Gate) at the northern end of Route 15, or from the AAFB Main Gate off Route 9. Existing family housing would be demolished and 912 family housing units would be constructed as replacements for existing AAFB housing in addition to the 535 family housing units required for USMC families. All of the 1,447 family housing units would be integrated into one large housing pool where all eligible personnel and families would live.

Expansion of existing community support facilities, such as the child development center, youth center, and temporary lodging facility may be required. Other potential new facility construction may include a new temporary lodging facility, a new community center, and a new Family Support Center.

The existing capacities of the utilities for the proposed AAFB family housing area are deemed adequate for the proposed redeveloped area. The proposed increase in the number of housing units and facilities is minimal compared to the current number of housing units and facilities. Additionally, the new facilities would implement energy and water efficient features meeting Leadership in Energy and Environmental Design silver or greater standards, which would reduce utility requirements. Revised distribution for potable water, and wastewater collection would be required.

Potable Water

Water for the family housing area would be provided by the current system, which would be modified to reroute the system along the new road alignments desired for the family housing layout. There will be a connection from the AAFB well field water storage tank to the AAFB water system to provide water to the proposed AAFB family housing area. The new potable water distribution pipes would be installed underground at least 3 ft deep. The width of the trench to install the pipes would be about 1.5 ft to 4 ft for 6-inch (in) to 24 in. pipes.

Wastewater Collection

The family housing wastewater collection system would include a network of gravity mains, manholes, two new wastewater pump stations; force mains and refurbishment of existing wastewater pump stations.

The family housing wastewater collection system would utilize the existing connection to the GWA wastewater collection system and would remain as is. Existing wastewater pump stations would be demolished as part of the Proposed Action. Wastewater would be conveyed to the NDWWTP for treatment and disposal.

Power

The existing AAFB main substation would have adequate capacity to serve the family housing, including the redeveloped housing units, new common facilities, and expanded common facilities. The distribution system would be rebuilt, enhanced, and reconfigured to accommodate the housing layout.

Solid Waste

Family housing areas would continue to have their solid waste handled as currently done for the existing AAFB housing area (Layon landfill).

2.2.4 Live-Fire Training Range Complex

The proposed LFTRC development area at AAFB NWF will require construction of the individual ranges, range support building, range towers, range access roads, and a perimeter fence (all within federally-controlled land at NWF), relocation of an ungulate exclosure fence, as well as the replacement of USFWS facilities within the Ritidian Unit of the Guam National Wildlife Refuge (GNWR) access to which would be restricted only while the Surface Danger Zone (SDZ) for the MPMG range is in use. The proposed area for the new GNWR administration buildings, visitor's center, and associated road and parking lot is approximately 12 acres (5 ha). The LFTRC would also require construction of new electrical, telecommunication, wastewater and water lines and/or facilities configured to operate with the existing utility infrastructure of AAFB NWF. The DON will coordinate with the GNWR to determine whether the current buildings will remain or be demolished.

The proposed LFTRC would include a known distance (KD) rifle range, KD pistol range, non-standard small arms (NSSA) range, modified record of fire (MRF) range, repairs to Route 3A, and a MPMG range. Grading requirements for construction of the ranges and associated infrastructure would include approximately 2,045,989 yd^3 (1,564,270 m^3) of cut and 1,921,210 yd^3 (1,468,870 m^3) of fill, resulting in a net requirement of 124,779 yd^3 (95,400 m^3) of cut. The limits of development for the LFTRC are depicted in Figures 2-5 and 2-6.

Development of the LFTRC is anticipated to occur in two phases that would construct the smaller ranges and repair/improve Route 3A under one phase and the MPMG range under the second phase.

The proposed LFTRC development would also include three range observation towers, target storage and maintenance shed, ready issue ammunition magazine, covered bleachers, portable toilets, perimeter fencing, safety signage, and parking. Range footprints would be entirely cleared of vegetation and the range would be designed with berms to contain expended rounds of ammunition within the range footprint. The LFTRC is an "open" range that does not include design elements such as overhead baffles to contain rounds beyond the traditional "backstop" berms. A more detailed description of the ranges, including the approximate footprint of each range, is fully described in the DSEIS Section 2.2.3.

Range utilization would depend on the number of personnel required to complete annual individual training events, the duration of each event, and the training capacity of each range. Proposed live-fire operations at the LFTRC are not continuous and would occur between 7:00 a.m. and 7:00 p.m. for up to 39 weeks per year, and night operations (estimated to occur 2 nights per week over 39 weeks per year) would occur between 7:00 p.m. and 10:00 p.m. or 6:00 a.m. and 7:00 a.m.

Figure 2-5. LFTRC – NW Field

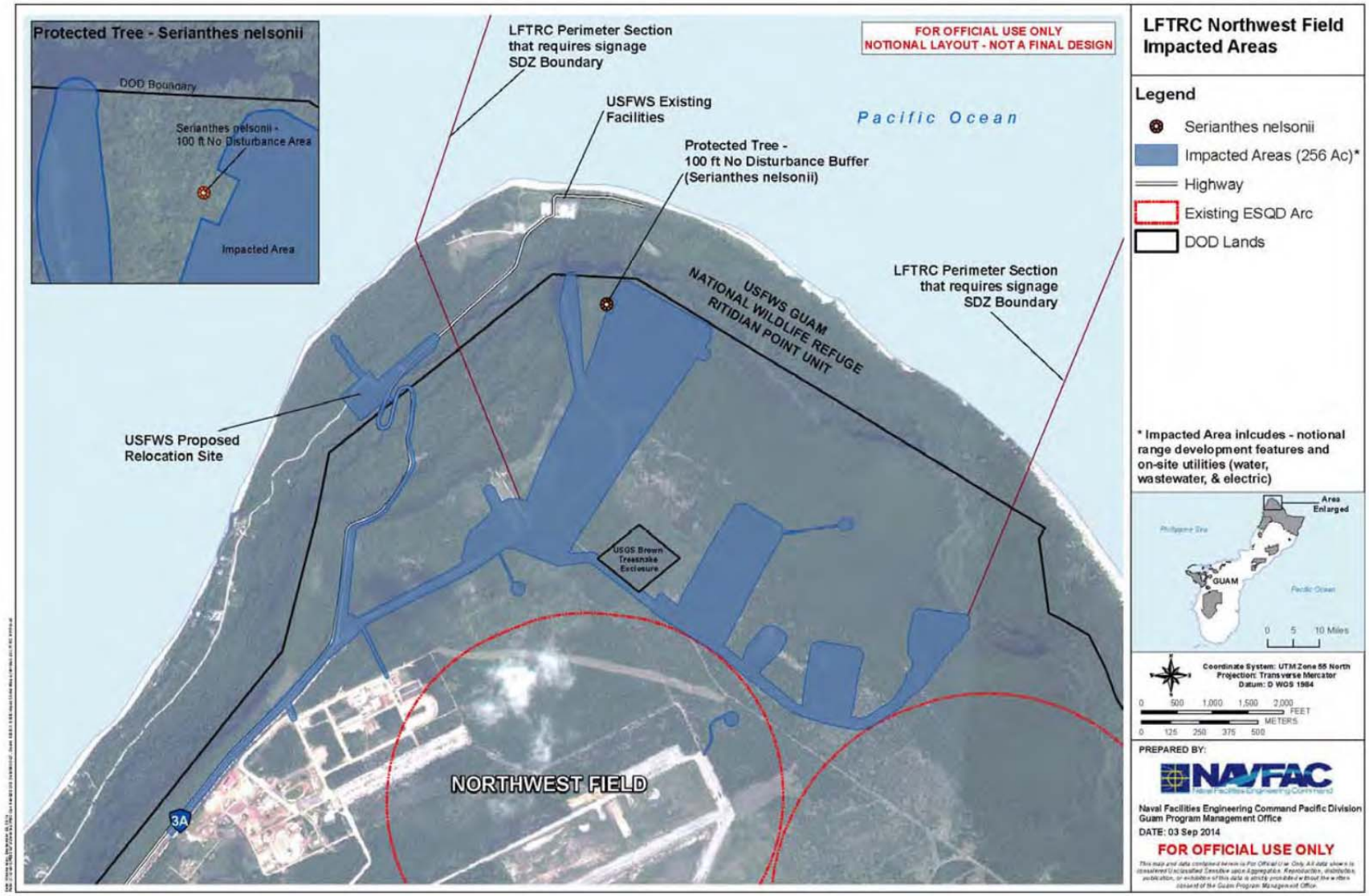
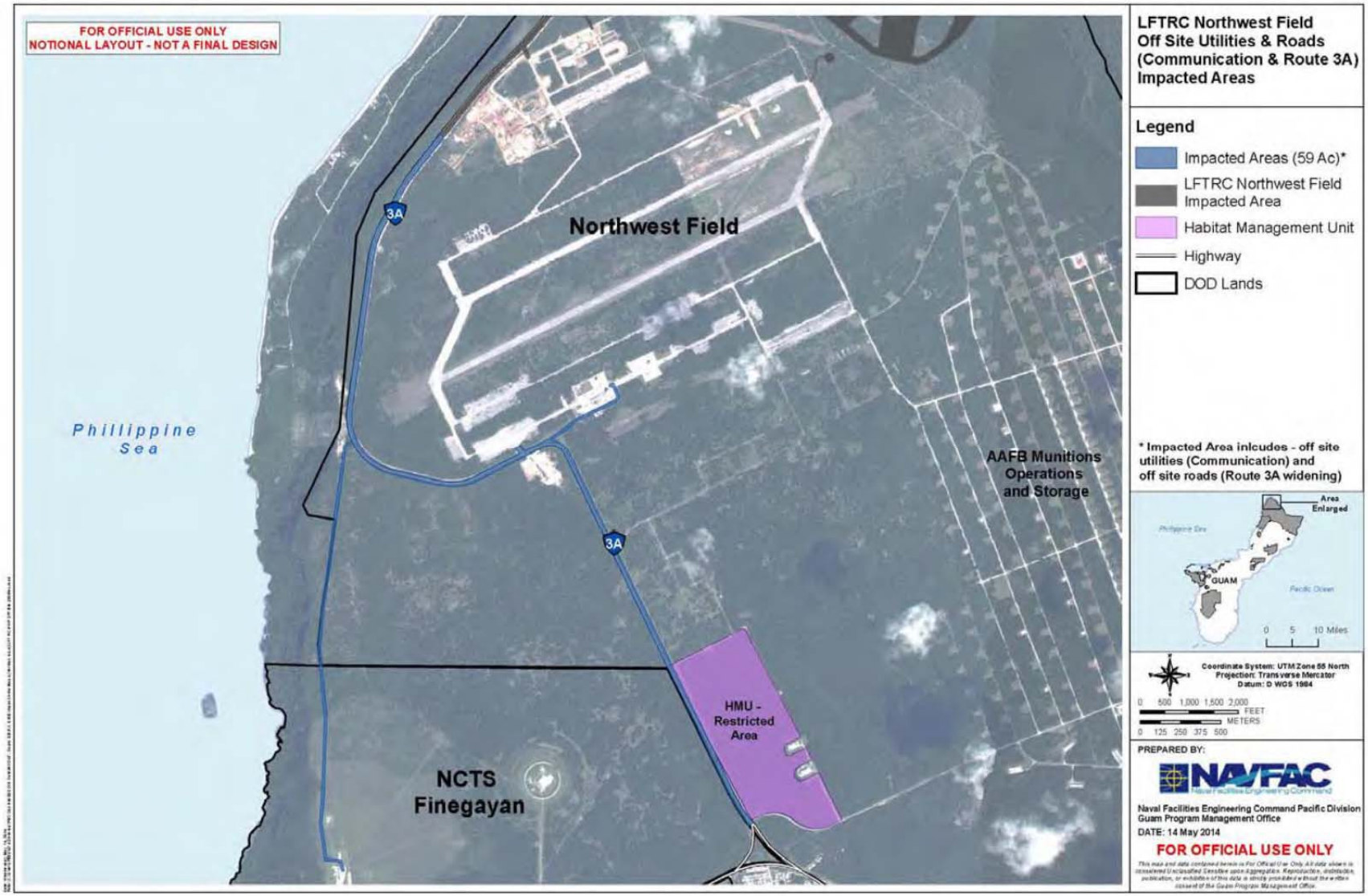


Figure 2-6. LFTRC – NW Field Utilities & Route 3A



Following construction, some non-native, non-invasive grassy vegetation may be utilized for erosion and storm water control in some areas of the range footprint in accordance with the DON's Guam Landscaping Guidelines.

In addition to the physical range footprint, an SDZ would delineate areas that fired ammunition fragments or ricochet may land, forming the outermost limit of the LFTRC. The DoD standard for risk acceptance on ranges is a 99.9999% level of containment, which means the probability of munitions (for inert ordnance) or a hazardous fragment (for live ordnance) escaping the SDZ is one in a million. The SDZ projects north and outward over lands under USFWS control and onto federal submerged lands. No construction or vegetation clearing will occur in the SDZ except for installation of signage. The DON would demarcate the SDZ beyond the shoreline through navigation map updates to alert maritime traffic of the potential hazard. For the land based perimeter of the SDZ, perimeter access roads (KD and MPMG), perimeter fencing and/or signage would indicate its boundaries for personnel and public safety. Approximately 3,701 acres (1,498 ha) acres of lands and submerged lands are required to support the SDZ. This includes approximately 142 acres (57 ha) of the Ritidian Point Unit of the GNWR and 3,059 acres (1,238 ha) of the submerged lands of the Philippine Sea.

The LFTRC (as well as the Hand Grenade (HG) Range in the next subsection) would be managed in accordance with Marine Corps Order (MCO) 3550.10, Policies and Procedures for Range Training Area Management, which addresses safe, efficient, effective, and environmentally sustainable use of the range area. Examples of measures include a Range Safety Program, range maintenance, event scheduling, access control, fire management, and environmental protection and monitoring activities. A thorough explanation of range management measures that remain inherent to the Proposed Action can be found in the 2010 FEIS (Volume 2, Chapter 2, Section 2.3.1.4).

Fire management is a key component of range management. The DON goal is to reduce the impact of fires by limiting their frequency, size, and severity while still allowing the USMC to maintain a high level of combat readiness. The range management plan will include the following elements of fire management:

1. A Fire Danger Rating System tailored to the specific military uses at the LFTRC and the local weather and fuel conditions will be established. Weather readings will be taken every hour by remote automated weather stations (RAWS) placed at the installation. This information is immediately available to Range Control, who use the output from the remote automated weather stations to determine the level of fire danger. This, in turn, determines any restrictions placed on military training for that hour. Restrictions are relayed to troops in the field via radio transmission. By restricting highly fire prone activities during periods of high fire danger, the likelihood of a fire start is reduced. Additionally, fires that are ignited are more likely to occur during periods of low or moderate fire danger, making them easier to control and extinguish.

2. Locations and standards of fire breaks and fuel breaks. Fire breaks are similar to four-wheel-drive roads and are cleared of all vegetation to mineral soil. Fuel breaks are swaths of cut, burned, grazed or otherwise modified vegetation so that a fire's behavior is reduced. The fuel break widths are determined by fuels, topography, and prevailing winds. The frequency of a fuel break's upkeep is dependent on the speed of regrowth and/or colonization. Generally speaking, fuel and fire breaks in wetter locations require more frequent upkeep because vegetation will grow more rapidly than in dry locations.

3. Fuels management. All available fuel management techniques will be considered for fire break, fuel break, or fuel management area. Standard on-the-ground application is limited to mechanical cutting, herbicide application, and prescribed fire.

4. Fuel management corridors will be established and maintained providing areas through which fire will not carry. These corridors will provide several distinct areas where fire may be contained in order to prevent a catastrophic fire event. Each corridor will be approximately 100 to 300 m wide, although terrain, safety concerns, or protected resources may constrain the width in some areas. Fuel specifications within the corridor require that canopy cover not exceed 20 percent.

5. Standard Operating Procedures (SOP). SOPs outline responsibilities for fire prevention, Fire Danger Rating System usage, staffing levels, equipment caches, fuel modifications, proper fire suppression actions, and post-fire reports. The SOPs also include fire prevention briefings to be given to range users prior to commencement of training, notification lists in case of fire, operational decision charts for fires, and maps of resources, fuels, fire breaks, and Fuel Management Areas.

6. Range Control approval and guidance. Prior to firing all pyrotechnics (including tracers), Range Control approval and guidance must be obtained. Fire Department and Range Control personnel will have the authority to stop live-fire training for non-compliance with any training regulation and/or Standard Operating Procedures.

7. Fire Suppression. Water trucks (pickup truck with a tank in the back) will be on-site as a first responder vehicle. Water trucks may be supported by a fire truck or helicopter, as warranted.

The proposed LFTRC development area at AAFB NWF will require re-location of an ungulate exclosure fence at NWF that was a conservation measure to offset habitat loss from vegetation clearing and aircraft operations associated with the Intelligence, Surveillance, Reconnaissance (ISR) Strike BO (2006-F-0266) and NWF Beddown project (2006-1-0281). The NWF Beddown project proposed to construct a 133 ac (54 ha) ungulate exclosure while the ISR Strike project consists of an approximately 494 ac (200 ha) fenced area to prevent incursion of deer and pigs. To date, a 312 ac (126 ha) ungulate fence at NWF has been constructed. The fence compensates for 113 ac of NWF Beddown and 199 ac for the ISR Strike project.

In order to compensate for the loss of the 312 ac ungulate fence, the Marine Corps relocation program will install approximately 17,559 ft of ungulate exclusion fencing in the area referred to as North Finegayan, right (Figure 2-14). The ungulate exclusion fencing will encompass approximately 312 ac of forested vegetation.

Consideration and fulfillment of all other components of the ISR Strike conservation measures will be subject to future consultation between the Air Force and USFWS.

2.2.5 Hand Grenade Range

In addition to the small arms training ranges collocated within the proposed LFTRC, the Proposed Action also includes a development area for a separate HG Range at Andersen South, depicted in Figure 2-7. The proposed HG Range would include an approximately 0.9 acre area developed as a hand grenade training complex for the M67 fragmentation grenade and will be connected to existing utility infrastructure where available.

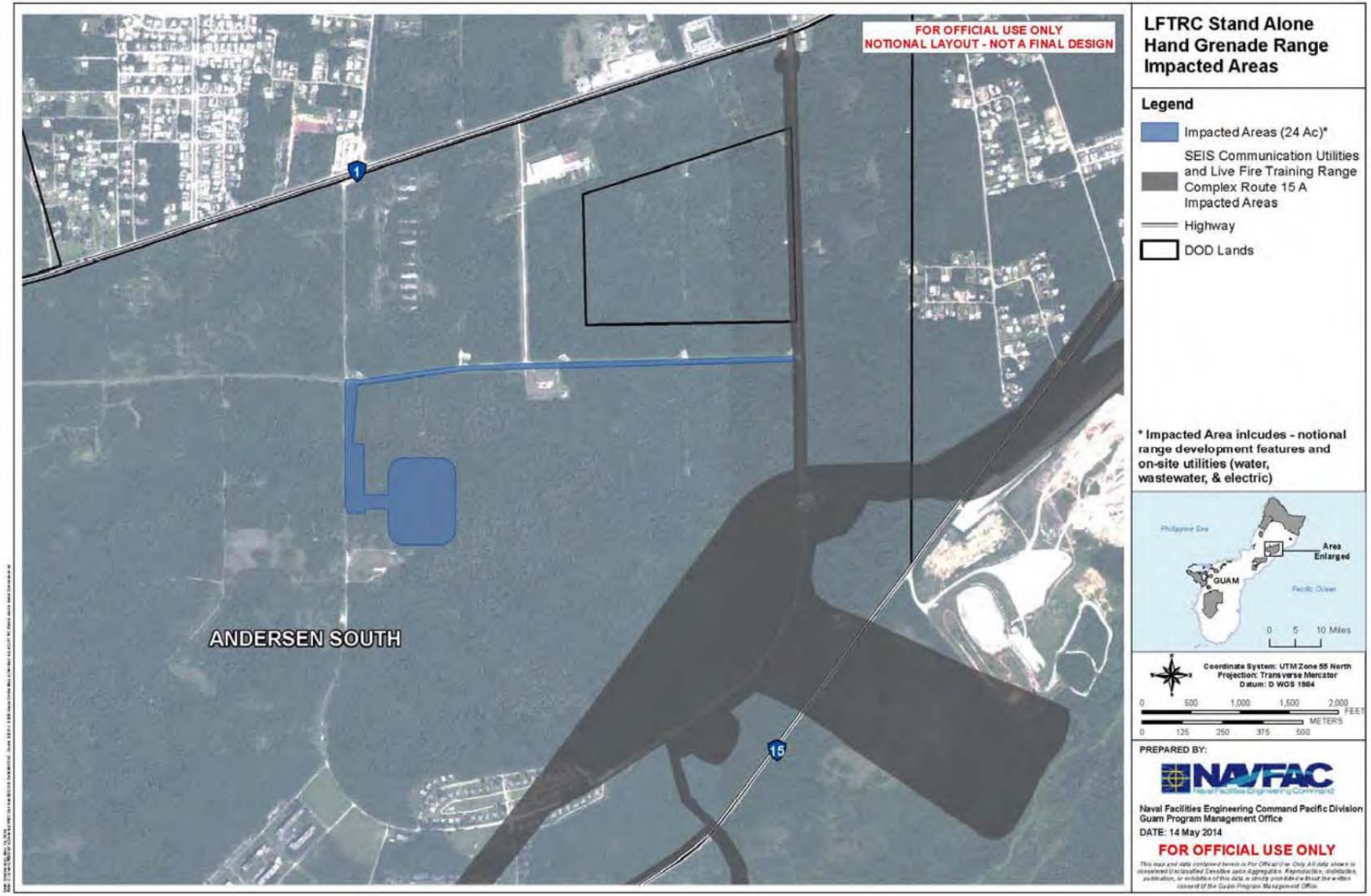
The following features would be developed within the hazard zone: a holding shelter for four persons, four throwing positions with grenade sumps, a range observation tower with ballistic glass, and a grenade

"dudded" impact area. A grenade house would be collocated with the grenade throwing pits. There will also be a concrete munitions storage (i.e., magazine) surrounded on three sides by earthen berms for the temporary storage of hand grenades during training events. In addition to the live-fire area, there would be a 1.0 acre non-live-fire training area developed adjacent to the range and outside of the SDZ. The training area would consist of a demonstration area with bleachers, an open practice throwing field with various targets and throwing positions, portable toilets, and a parking area. Inert practice grenades would be used at this training area to provide familiarization training prior to proceeding onto the live-fire area of the range.

2.2.6 Information Technology/Communications

The proposed Information Technology/Communications (IT/Comm) development area would require inter-base connections between the proposed USMC main cantonment area, and other existing bases, the proposed LFTRC, and 2010 ROD-covered training facilities at Andersen South. These hardwired connections would consist of up to eight 6 inch conduits buried approximately 3 ft deep. Off-site conduits would be encased in concrete and would have lockable manholes for security. Because redundant off-island communication paths are needed, an additional connection to the Tata Communications cable termination facility (in Piti) from AAFB may be required. Off-site conduits would follow existing roads and rights-of-way between the facilities, as shown in Figure 2-8. The completed utilities would not normally be visible after restoration of the disturbed ground to original or better condition (following the Guam Landscaping Guidelines) as these would be primarily underground.

Figure 2-7. Stand Alone Hand Grenade Range



2.2.7 AAFB Well Field and Associated Water System

Increased water supply for the main cantonment area would come from the proposed AAFB well field, refurbished wells, and Navy's existing water system. Based on conservative estimates, it is anticipated that to locate one well of sufficient yield to support production approximately three test wells would be required. During testing, only those wells with good water quality and capacity will be identified as production well sites. Test wells deemed unsuitable will be filled and capped and left in place, restored or converted to monitoring wells for management of the National Groundwater Level Archive.

The development area would accommodate the construction of the approximately 22 test wells, 11 production wells, and associated equipment as depicted in Figure 2-9. Note that the actual footprint of the final production wells and the access roads to each is not known at this time, but it would occur within the well field limits as shown.

During the design phase, the design contractor will conduct site investigations and drill test wells, determine locations of the wells, and design the entire water production system (wells, feeders, & storage tank). During the construction phase, the construction contractor will convert the test wells into production wells based on the locations identified in the design document and construct the water production system per the design specifications.

- Prior to start of work, efforts will be made by the design contractor to minimize disturbance to the limestone forest by inspecting the area with a DON biologist and identifying "already disturbed areas."
    - Where disturbed areas cannot be identified, for each well location, a 14 ft path will be created for the drill rig, trucks/vehicles and other equipment to get to the test well locations.
    - An approximately a 100 ft x 100 ft (.23 ac) work area will be required to set up the equipment at each test well location.
    - For each test well, an 8 in. to 12 in. borehole will be drilled to a depth of approximately 500 ft to 600 ft below ground surface. A submersible pump will be placed at the bottom of the well, and a pump test and water sampling conducted. Based on the results of the pump test and water sampling, the well will either be abandoned or identified as a potential production well. For test wells identified as a potential production well, global positioning system survey coordinates will be taken and a stake placed at the test well site.
    - A production well consists of well casing (approx. 10 to 12 in. diameter), screen, gravel pack, submersible well pump, pump motor housing, and surface/borehole seal. At each well station the following will be provided: well housing, discharge piping, and flow meter. Each well head will have electrical lines, water transmission pipes, and feeders to each well. The estimated disturbance area during construction is 100 ft x 100 ft (.23 acres).
    - Locations of the water transmission and feeder lines will normally follow already disturbed areas made during test well drilling (path made by the drill rig/vehicles/equipment). A 20 ft to 30 ft wide strip will be required for construction of the pipelines, and manholes, valves, bends, anchor blocks, etc. as well as backfill material. The main transmission lines ranging from 8 in. to 16 in. will connect the well field storage tank facility to feeder lines. The individual well feeder lines, approximately 6 in. will connect the wells to the main transmission lines.
    - In the well field storage tank facility area, there will be a booster pump, water treatment, storage tank, electrical room and central emergency backup

generator and fuel storage tank. In addition to the 14 ft path for cranes/vehicles/equipment, an approximately 550 ft x 650 ft area (8.2 acres) will be disturbed during construction of the water storage tank and associated facilities.

  - Unless cuttings or excavation materials are deemed contaminated or unacceptable as fill material, cuttings will be placed back into a borehole or trench. Unacceptable fill material or excess cuttings/excavation material will be removed from the site.

- When 68 acres (75% of the disturbance area) is reached, the construction contractor will stop work and re-evaluate to determine if 90 acres will be exceeded.

The new potable water production wells would feed a new well field collection tank, pump and water treatment facility (chlorination and fluoridation), all proposed within AAFB. The main cantonment area would be provided with a new ground level water storage tank supplied by the new well field storage tank. A water pump station with an emergency generator would be utilized. The new potable water distribution pipes would be installed underground with a minimum depth of 5 ft. The width of the trench to install the pipes would be about 1 ft to 3 ft.

2.2.8 Off-Site Utilities (Water, Sewer and Electrical)

The Proposed Action will require a development area for off-base water and electrical utilities to support the main cantonment, family housing and LFTRC activities. Although the linear construction occurring alongside roadways would be limited to narrow areas of trenching and excavation for installation of utilities along the affected alignment, a 50-foot corridor was included to conservatively capture potential disturbance. The extent of the proposed area of development is depicted inn Figure 2-10 and is inclusive of the disturbance buffers. The Off-Base Utilities development area would upgrade existing 34.5 kV electrical lines, by installing a new underground 34.5 kV line from Harmon Substation to AAFB Main Substation.

The off-base water distribution system will convey water produced at the new AAFB well field to the main cantonment area through Routes 9 and 3A.

2.2.9 Guam High School Expansion

The proposed Guam High School development area located at the Naval Hospital site in central Guam would expand the existing facility to accommodate additional students associated with the USMC relocation. The existing school is a two-story, 116,174 ft^2 facility designed to accommodate approximately 500 students. The limit of disturbance within the existing open space is depicted in Figure 2-11.

The additions to the existing building will increase available space by approximately 25,500 ft^2 (2370 m^2) and would typically include construction activities such as geotechnical studies for design, site grading, utility excavation, drainage and footing preparation, and construction of building-associated structures (e.g. foundations, walls, columns, roof systems, etc.). The completed work will also include indoor/outdoor lighting, air conditioning, fire protection, telecommunication, space furnishings, final landscaping, and other appurtenances and features to ensure a fully-functional and usable educational facility.

Figure 2-8. Communication Utilities – MC/FH FIN/AAFB & LFTRC Northwest Field

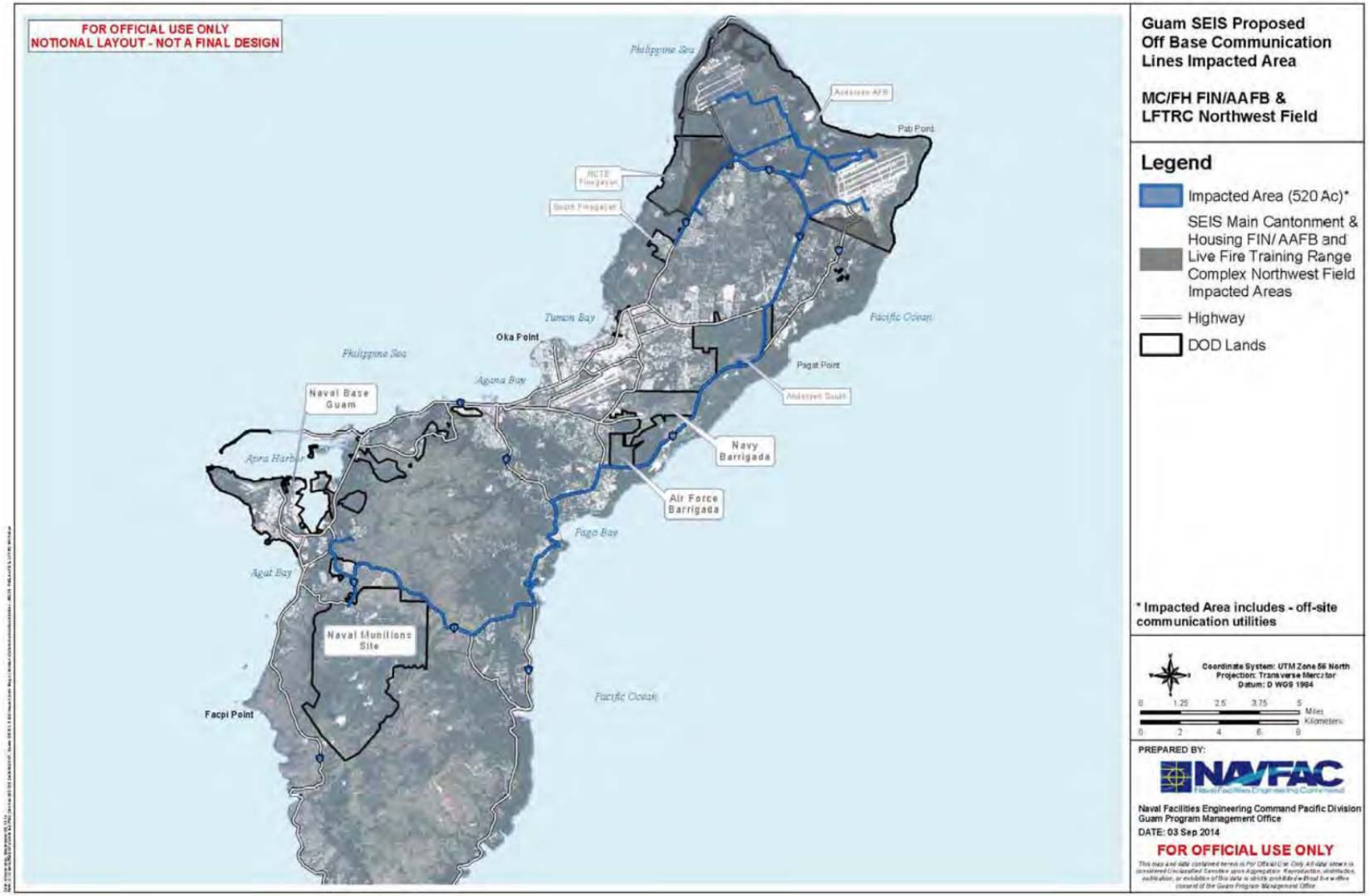


Figure 2-9. Water Well Development Area

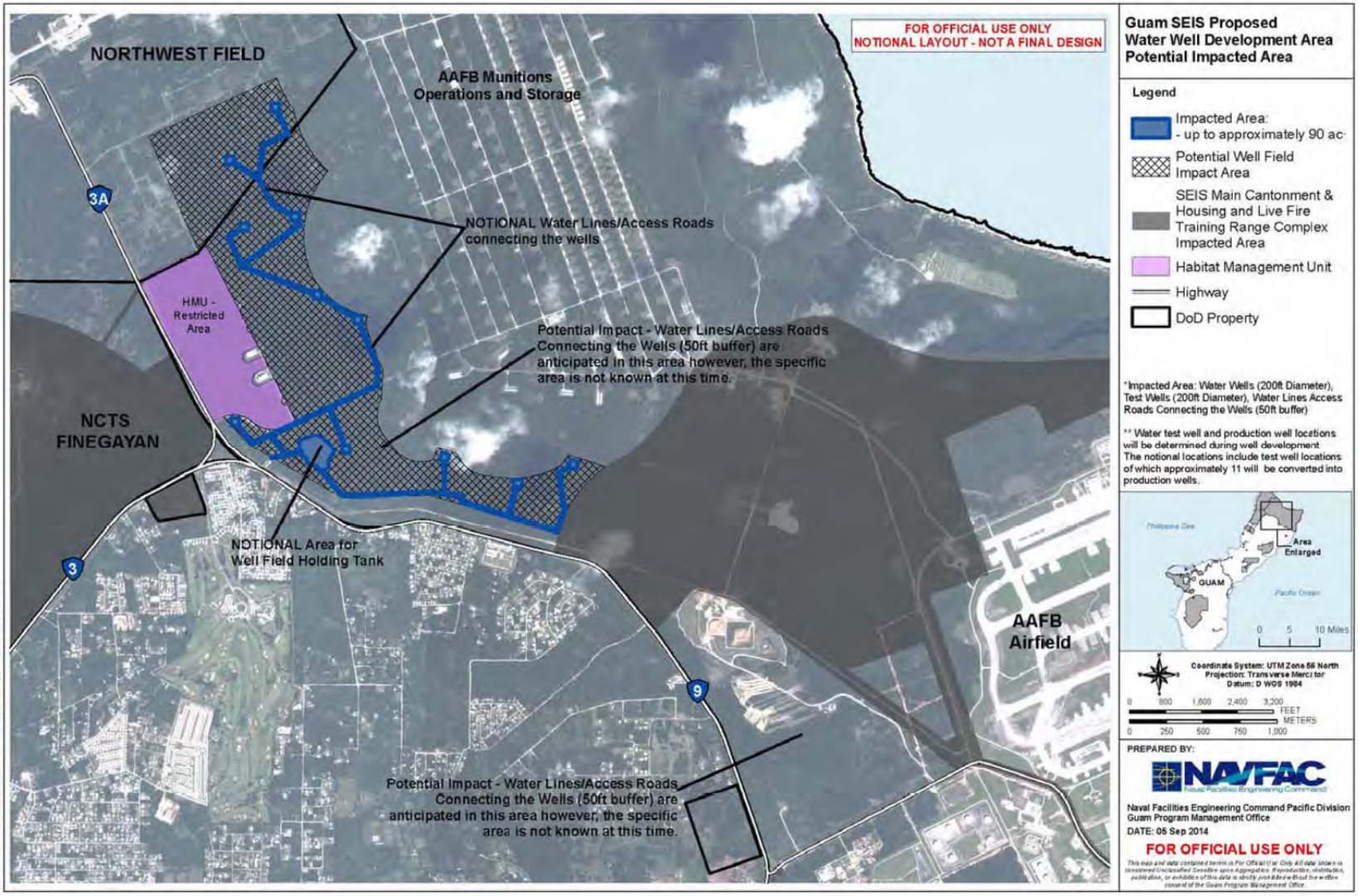


Figure 2-10. Electrical and Water Off-Base Utilities

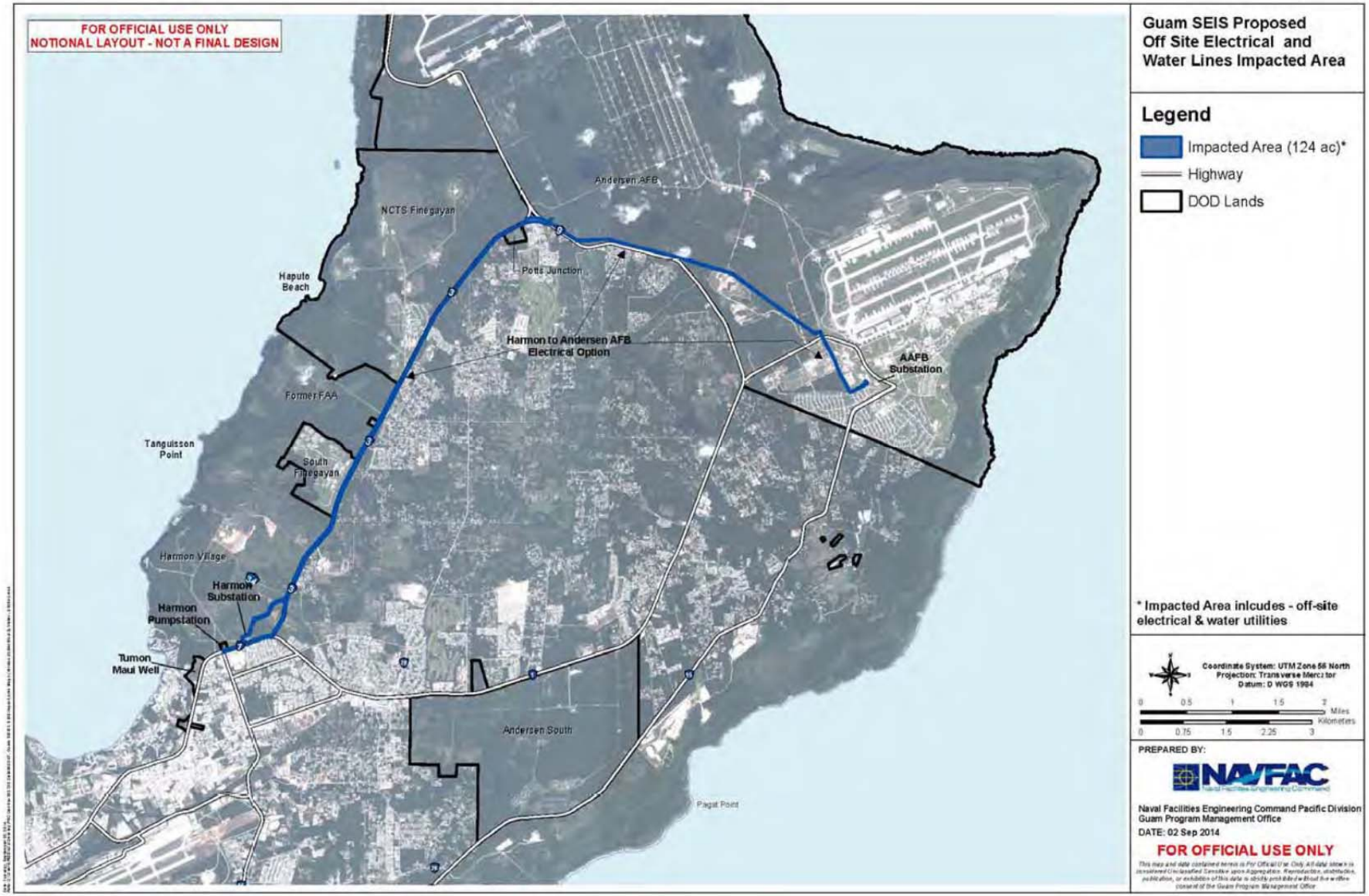
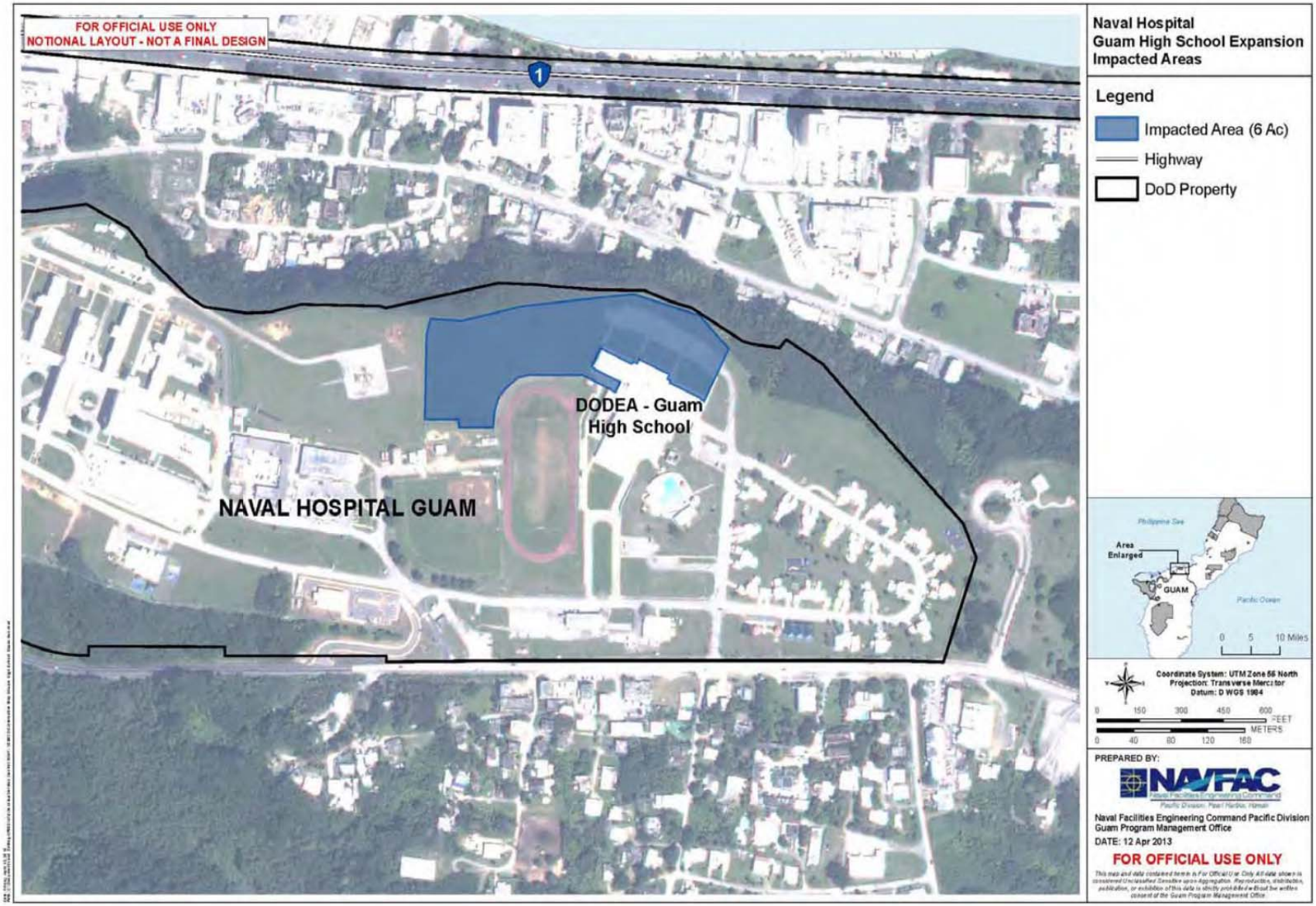


Figure 2-11. Guam High School Expansion

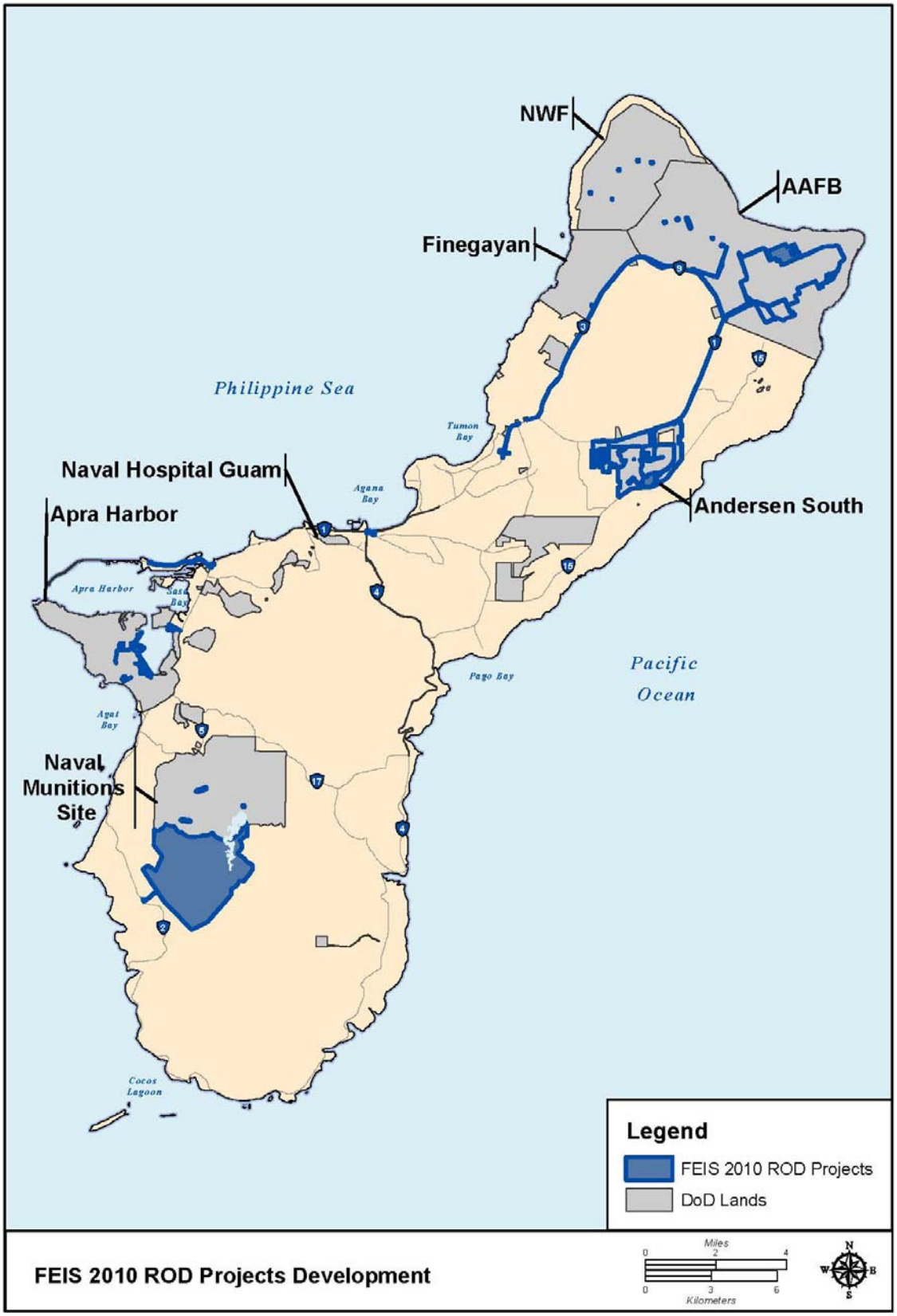


2.2.10 2010 ROD Projects Development Areas

The 2010 ROD related actions that were not affected or remain unchanged by the 2012 Roadmap Adjustments SEIS are discussed in detail in the 2010 FEIS (Volume 1, Chapter 2: Overview of Proposed Actions and Alternatives, Section 2.2: Marine Corps Relocation – Guam, pages 2-7 through 2-17), and are summarized in Table 2-2 (adapted from DSEIS Table 6.2.1-1), summarized in the 2010 BO, and depicted in Figure 2-12.

The proposed carrier berthing, four ranges and associated infrastructure on Tinian, and the Army Missile Defense Task Force assignment to Guam are not included as part of the Proposed Action and have an independent disposition from the USMC relocation.

Figure 2-12. 2010 ROD Projects Development Area



2.3 BEST MANAGEMENT PRACTICES

The SEIS identifies Best Management Practices (BMPs) that are incorporated into the Project Description. For the purposes of the SEIS, BMPs are existing policies, practices, and measures that the DON would adopt to reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing, reducing, or eliminating impacts, BMPs are distinguished from potential mitigation measures proposed in the SEIS because BMPs are:

(1) Existing requirements for the Proposed Action,

(2) Ongoing, regularly occurring practices, and

(3) Not unique to the Proposed Action.

The BMP's from the SEIS applicable to the BA are listed in Table 2-2.

Table 2-2. Best Management Practices Applicable to this BA

BMP	Description	Impacts Reduced/Avoided	Timing
Contractor Education Program	The DON contractor education program is to ensure construction contractor personnel are informed of the biological resources in the project area, including invasive species, special-status species, avoidance measures, and reporting requirements.	Inadvertent impacts to terrestrial biological resources due to lack of awareness of resource presence, sensitivities, and protective measures	Pre-C and C
Contractor Plans and Specifications	All construction will occur within the limits of construction shown in the plans and specifications.	Habitat loss	Pre-C and C
Pre-Construction Surveys for the Mariana Fruit Bat	For projects within or in the vicinity of suitable fruit bat habitat, surveys following the USFWS-approved Joint Region Marianas (JRM) protocol will be conducted 1 week prior to the onset of work. If a fruit bat is present within 492 ft (150 m) of the project site, the work must be postponed until the bat has left the area.	Avoid and minimize impacts to fruit bats	Pre-C and C
Biosecurity Measures	Incorporate biosecurity measures (e.g., brown treesnake (BTS) interdiction measures, onsite vegetation waste management procedures, outreach/education, rapid response, and monitoring the effectiveness of HACCP) into construction, operations or training events.	Inadvertent spread of non-native species on Guam or to other locations off of Guam. The implementation of biosecurity measures decreases the likelihood of introducing pests harmful (either predation or outcompeting native species) to native vegetation, invertebrates, vertebrates, as well as human health	Pre-C, C and Ops
Hazard Analysis and Critical Control Point (HACCP) Plan	Construction contracts contain a requirement to develop a HACCP Plan which will identify risks and potential pathways for non-native species and will outline procedures for controlling and removing risks identified. Construction contracts also contain a requirement for inspections and proper re-use or disposal of vegetation to avoid contributing to the further spread of the coconut rhinoceros beetle. HACCP plans will be approved and inspected by the biological monitor.	Inadvertent spread of non-native species on Guam or to other locations off of Guam.	Pre-C and C
Guam Landscaping Guidelines	Appropriate or non-invasive species will be planted in all new landscapes.	Reduce potential impacts associated with non-native vegetation, promotes habitat for native species, reduces water consumption, and reduces the need for fertilizers.	C

LFTRC Range Berm Controls	LFTRC range berms will contain native or non-invasive herbaceous vegetation, and other engineering controls.	Helps to manage stormwater runoff and control erosion. The berm will minimize the number of bullets that may fall outside the range footprint.	C
Brown Treesnake Interdiction (36 Wing Instruction 32-7004, Brown Tree Snake Control Plan and COMNAVMAR Instruction 5090.10A, Brown Tree Snake Control and Interdiction Plan).	Joint Region Marianas (JRM) has established a comprehensive BTS interdiction program to ensure that military activities, including the transport of civilian and military personnel and equipment to and from Guam, do not contribute to the spread of BTS. Interdiction requirements (e.g., trapping and inspections at ports and cargo facilities, aircraft, inspections of household good movements, and biosecurity plans for training events) are specified in instructions (Appendices B and C) as well as the annual Work Financial Plan that is developed in cooperation with USDA Wildlife Services.	Inadvertent spread of BTS to other locations off of Guam	Pre-C, C and Ops
Lighting Installation	Lighting will be designed to meet minimum safety, sustainability, antiterrorism, and force protection requirements. Hooded lights will be used to the maximum extent practicable at all new roads and facilities within sea turtle land habitat and fruit bat roost areas. "Night-adapted" lights will be installed in the briefing and bleacher areas at NWF and Andy South. Illumination of forest, coastline or beach will be kept to an absolute minimum.	Avoid and minimize impacts to sea turtles and fruit bat roosts.	Pre-C, C and Ops
Aviation training in NMS	All aviation training will be conducted so that flights will approach the southern portion of the NMS over the Talafofo River watershed and Fena Reservoir at heights of 1,000 ft (305 m) or greater above ground level. Flights may go up the Ugum River at altitudes of 1,000 ft (305 m) or greater above ground level until they reach 9,843 ft (3,000 m) from the mouth of the river at Highway 4 and then flights may conduct low level terrain flights. Low-level training flights will be restricted to the southernmost portion of the NMS where swiftlets are not commonly present.	Avoid and minimize impacts to Mariana gray swiftlets	Ops
Ground training in NMS	Consistent with the MIRC BO, the DoD will maintain 328-ft (100-m) no training buffers around the known Mariana swiftlet nesting caves (e.g., Mahlac Cave, Fachi Cave, Maemong Cave) in NMS.	Avoid and minimize impacts to Mariana gray swiftlets	Ops

Legend: C = construction; Ops = operations; Pre-C = preconstruction;

2.4 CONSERVATION MEASURES TO MINIMIZE POTENTIAL EFFECTS TO THREATENED AND ENDANGERED SPECIES

This section describes the conservation measures the DON has or will implement to minimize or compensate the effects on listed species due to construction and operations. Conservation measures are actions intended to benefit or promote the recovery of listed species. Some conservation measures were initiated in accordance with the 2010 BO and some are new conservation measures designed to specifically address the direct and indirect impacts to threatened or endangered species as a result of the revised Proposed Action (Table 2-3).

As part of the proposed action, DON is committed to implementing the conservation measures listed below. After completing the conservation measures, the long-term management of the natural resources will be incorporated into the Integrated Natural Resources Management Plan for the installation."

Table 2-3. Conservation Measures Applicable to this BA

Conservation Measure	Status
Regional Biosecurity Plan	In progress – initiated as part of 2010 BO
Biosecurity Outreach and Education	In progress – initiated as part of 2010 BO
Brown Treesnake Interdiction at the Commercial Ports	In progress – initiated as part of 2010 BO
Brown Treesnake Research and Suppression	
BTS Fence (160 ac unit)	Future proposed
BTS Fence (300 ac unit)	Future proposed
BTS suppression (160 ac unit)	Future proposed
BTS suppression (300 ac unit)	Future proposed
Feral Cat Control (160 ac unit)	Future proposed
Feral Cat Control (300 ac unit)	Future proposed
Rodent Control (160 ac unit)	Future proposed
Rodent Control (300 ac unit)	Future proposed
Install ungulate fence (NBG) and initiate ungulate eradication (3,114 acres)	Completed
Forest enhancement (approximately 1,072 acres)	
Install ungulate fence (Fin, N. Fin)	Future proposed
Ungulate eradication/control (Fin, N. Fin)	Future proposed
Invasive plant removal (Fin, N. Fin)	Future proposed
Native plant outplanting (Fin, N. Fin)	Future proposed
Native plant establishment (Fin, N. Fin)	Future proposed
Serianthes Bracing	Future proposed
Sea Turtle Public Outreach	In progress – initiated as part of 2010 BO
Mariana Fruit Bat Recovery Actions on Rota	Completed

2.4.1 Regional Biosecurity Plan

To address pathways and encourage a more holistic approach to managing invasive species, the DON has funded the development of a Regional Biosecurity Plan (RBP) for Micronesia and Hawaii (formerly referred to as the Micronesia Biosecurity Plan). Individual activities for various species will continue, but the DON and others agree it is more efficient to manage pathways and prescribe corrective measures for a suite of species which will be monitored at discrete control points over time. The RBP will provide stakeholders in Micronesia and Hawaii with a platform for coordination and integration of inter-agency invasive species management efforts such as control, interdiction, eradication, and research.

1. Phase I Risk Assessments: The DON contracted with the United States Department of Agriculture (USDA) Wildlife Services, USDA Animal and Plant Health Inspection Service (APHIS), Plant and Protection and Quarantine, USDA APHIS Veterinary Services (terrestrial), U.S. Geological Survey Biological Resources Discipline (freshwater), and Smithsonian Environmental Research Center

(marine) for the development of the risk assessments for the RBP. In addition, the National Invasive Species Council was contracted to coordinate the preparation of the risk assessments for the RBP and prepare an executive summary. Phase I was completed in July of 2013.

2. Phase II Peer Review and Strategic Implementation Plan: In September of 2011, the DON entered into a cooperative agreement with the University of Guam (UoG) to develop Phase II of the RBP. The UoG was tasked with reviewing all three risk assessments and providing an assessment as to whether the three risk assessments were comprehensive within their respective environment and sufficiently addressed risks posed to Micronesia and Hawaii. The UoG and its resource expert collaborators evaluated each risk assessment to ensure they sufficiently:

a) evaluated the biosecurity risks particular to each environment;
b) addressed organisms to be of greatest risk to Micronesia and Hawaii (as it relates to Micronesia);
c) identified the necessary elements of an effective biosecurity program;
d) identified management responses that are the most appropriate and have been described and prioritized in sufficient detail to allow for ease of implementation; and
e) incorporated the input of the relevant regional entities with responsibilities for biosecurity.

The review of the risk assessments was completed in January of 2013.

The UoG was also tasked with developing a strategic implementation plan. The strategic implementation plan component is to:

a) identify and analyze challenges to regional implementation of the RBP and provide multiple implementation alternatives, where appropriate;
b) identify infrastructure, funding, process, political, legislative, policy and capacity gaps within the various region's agencies and jurisdictions relevant to potential invasive species pathways;
c) identify policy and regulatory changes needed to achieve 100 percent prevention, control and treatment for the identified highest risk pathways, ports of origin, and species for the region;
d) evaluate the technical and institutional capacity (staff, training, etc.);
e) assess infrastructure needs;
f) coordinate with related initiatives; seek out successful models, assistance and collaboration from organizations involved in invasive species management; analyze biosecurity program implementation elsewhere and assess applicability to Micronesian region;
g) target outreach and awareness;
h) identify potential long-term funding mechanisms;
i) identify methods for measuring success/effectiveness, as well as the labor/equipment costs, in U.S. dollars, required to maintain those methodologies;
j) address improvement of biosecurity protection actions;
k) address biological threats associated with enhanced military activities, tourism, trade, business and economic growth;
l) recommend solutions to challenges;
m) recommend strategies (and associated budgetary needs to implement each strategy) to achieve 100 percent prevention, control and treatment for the identified highest risk pathways, ports of origin, and invasive species for the region;
n) provide a template to realistically implement the biosecurity strategies identified in the RBP in the United States and within international frameworks.

In May of 2014, the UoG hosted a regional workshop in order for the jurisdictions and development partners to have a final joint working session in which to review and conclude the updating of the implementation component before finalizing the RBP. The final RBP will be completed in 2014.

Although the RBP is not finalized, several of the recommendations are incorporated into the Project Description as BMP's:

a. Onsite vegetation waste management procedures - Green waste will be handled by the contractors at designated laydown areas within the limits of construction. Contractors will be required to divert all the green waste. The larger-sized green waste consisting of trees and stumps will be processed into mulch and the smaller sized green waste will be processed into compost.

A proposed green waste processing facility at NBG Landfill may also be used to process green waste generated during construction. The DoD will seek permit authorization from the Guam Environmental Protection Agency for the proposed green waste processing facility.

b. DON's *Final Guam Landscaping Guidelines* - The DON has developed a manual providing landscaping design guidelines specific to appropriate plant selection and establishment for all the DON construction activities on Guam (NAVFAC Pacific 2011). This manual implements required DON policies including, but not limited to:

- use of native regional plants for landscaping;
- design, use, and promoting construction practices that minimize adverse effects on natural habitat;
- pollution prevention by reducing fertilizer and pesticide use, integrated pest management practices, recycling green waste (composting), and minimizing runoff;
- implementing efficient water practices; and
- preventing the introduction of invasive species.

c. Biosecurity outreach and education - The DON has initiated and will continue implement a targeted, comprehensive outreach and education program for DoD and civilian populations for biosecurity focused on prevention. As a starting point, the DON contracted for the development of biosecurity outreach and education materials. The contractor has designed and produced an activity booklet, a two-sided, tri-fold, educational brochure with an associated poster that differentiates native from introduced species, defines invasive species, describes the known impacts of invasive species on native species and ecosystems, and what can be done to prevent and control invasive species. This effort also included the development of radio public service announcements (PSA) in three languages, and a television PSAs both of which aired for one month in September of 2013 during peak broadcasting times.

Going forward the program may include the development of additional informational videos, expansion of the radio PSAs broadcasts, and other print media as well as active public outreach.

The DON's biosecurity outreach and education program has already begun concurrent with the actions that were initiated under the 2010 ROD and will continue until 5 years after the 2015 ROD.

d. HACCP planning - HACCP planning is a pathway management tool that provides a comprehensive method to identify risks and focus procedures to prevent spread of species through pathways. Construction work could unintentionally spread non-target (potentially invasive) species. These non-targets could hitchhike on construction equipment or be included in shipments of materials and supplies from locations outside of Guam. The pathways used by invasive species to move into new locations are not always obvious. Many problematic species, diseases, and parasites have been transferred to new locations as undetected (and unplanned) hitchhikers. HACCP planning is a management tool that provides a structured method to identify risks and focus procedures. Understanding pathways and developing plans to reduce non-target species and prevent biological contamination is necessary to avoid unintended spread of species.

In August of 2011, the DON sponsored several HACCP training courses for DON employees and construction contractors. A HACCP Planning Overview for Managers was held on Monday, August 8, 2011 and 2 two-day HACCP Planning courses were held August 9 & 10 and August 11 & 12, 2011. Over 60 people attended the three courses. Additional trainings are held at the various project sites when there is worker turnover.

For the 2010 ROD projects, the DON has required all construction contractors to develop and implement HACCP plans for their construction activities. The construction contractors are to identify and implement control measures to prevent the inadvertent movement of non-native, invasive species to Guam and to and from the project site to other locations. The contractor is required to establish appropriate facilities that comply with all environmental laws and regulations, provide training for proper vehicle hygiene, and promptly take corrective and preventative actions for noncompliance. This includes vehicle washdown and inspection for soil and other materials and appropriate control measures are implemented to prevent the inadvertent movement of non-native invasive species from the project site to other locations.

Construction contractors are required to provide documentation that supports prevention, worker awareness training, and control of non-native invasive and pest species in the project area and efforts to prevent the movement of non-native invasive species to areas outside the project area, whether in a purposeful or inadvertent manner. The contractor is responsible for ensuring that their employees receive applicable environmental and occupational health and safety training, and keep up to date on regulatory required specific training for the type of work to be conducted onsite. This may include, but is not limited to HACCP planning, species specific information (e.g., brown treesnake and coconut rhinoceros beetle), regulated pest list, threatened and endangered species information, and proper washdown and inspection techniques for equipment.

e. Monitoring to evaluate effectiveness of HACCP - To document the effectiveness of the HACCP implementation at construction sites, the DON has developed and implemented a long term monitoring program for terrestrial vegetation. For any clearing of vegetation that is adjacent to or contiguous with recovery habitat, the perimeter and 98.4 ft (30 m) into the habitat will be surveyed to identify vegetation community species composition.

The DON contracted a baseline ecosystem monitoring study for projects on AAFB in 2011. Transects were focused on areas where newly introduced species were most likely to occur. The intent of the project was to establish a baseline of both native and non-native plants present prior to the beginning of planned construction activities. This baseline will serve as a reference for subsequent monitoring efforts conducted concurrently with construction in order to aid in evaluating the success of implemented HACCP plans. The baseline will also provide a basis of comparison for relative abundances of invasive species during construction, as well as whether any species detected during long-term monitoring are newly introduced or were present prior to the beginning of construction. The AAFB project was completed in December 2012.

f. BTS Interdiction - JRM has established a comprehensive BTS interdiction program to ensure that military activities, including the transport of civilian and military personnel and equipment to and from Guam, do not contribute to the spread of BTS to other islands or regions. Brown treesnake interdiction requirements (e.g., trapping and inspections at ports, cargo facilities, and aircraft, inspections of household goods, biosecurity plans for training events) are specified in DoD instructions (i.e., 36 Wing Instruction 32-7004, *Brown Tree Snake Control Plan* (Appendix B) and COMNAVMAR Instruction 5090.10A, *Brown Tree Snake Control and Interdiction Plan* (Appendix C)) as well as the annual Work

Financial Plan that is developed in cooperation with USDA Wildlife Services. The Proposed Action will continue to comply with these established procedures.

In addition, as stated in the 2010 BO, the DON will fund any increase of current federally funded BTS interdiction measures (in Guam, CNMI, and Hawaii) where the increase is related to direct, indirect and induced growth caused by the USMC relocation to Guam. The fiscal year (FY) 2010 level of funding for the Federal interagency BTS interdiction effort on Guam, CNMI, and Hawaii and 2010 transportation levels associated with outbound cargo from Guam for the U.S. or U.S. territories will be used as the baseline. That funding will continue and become part of the DON's BTS interdiction funding under authority of the Brown Tree Snake Control and Eradication Act (7 USC § 8501 note) (USFWS 2010a).

As stated in the 2010 BO, the DON's responsibility to fund increased interdiction measures will cease one year after the end of the fiscal year in which both USMC relocation construction has ended and the permanent non-transient USMC military units have relocated to Guam.

Since the signing of the original BO, the DON has worked with USDA and USFWS to determine BTS interdiction cost increases. To date, there has been no measurable increase in interdiction costs according to USDA.

g. Rapid Response - BTS management, research, and coordination efforts have been refined and progressed to the point where USDA APHIS WS inspection rates for cargo and flights departing Guam are almost 100% and it has been two decades since a live BTS was detected in Hawaii (Draft BTS Strategic Plan 2014). The DON fully supports implementation of BTS rapid response that is currently provided for in the MIRC Biological Opinion (USFWS 2010b).

2.4.2 Brown Treesnake Research and Suppression

The DON has initiated support for large-scale, long-term efforts to refine methods for BTS control that will reduce the snake population on a landscape level more cost-effectively and increase the efficacy of capturing snakes in low-density situations.

In early FY12, the DON coordinated with the USFWS, USDA, and U.S. Geological Survey (USGS) on priority BTS research projects. The development of a bait formulation for BTS suppression was determined to be the highest priority research need. The USDA National Wildlife Research Center (NWRC) was funded for a multi-year project by the DON at the start of FY13 to implement the bait formulation research.

The DON will continue to fund selected research/design projects identified as priorities in the Brown Treesnake Technical Working Group Strategic Plan that are compatible with the military mission on Guam for up to 10 years from the start of main cantonment construction. Dependent upon the success of current experimental suppression activities within the Habitat Management Unit (HMU) or identification of an effective alternate technology, the DON will install a BTS barrier to exclude BTS from approximately 160 acres (65 ha). If the DON is successful at eradicating BTS within the 160 acres, the DON will install a second BTS barrier to exclude BTS from approximately 300 acres (121 ha). In response to decreased BTS densities, the rodent and feral cat population is expected to increase. In order to address this anticipated increase the DON will implement rodent and feral cat control. Rodent control would benefit recovery habitat as rodents consume seeds. Feral cat control would benefit the recovery of endangered birds as cats predate on native birds. The BTS fence areas are also areas proposed for forest enhancement (Refer to Section 2.4.3 and Figures 2-13 and 2-14).

2.4.3 Forest Enhancement

One of the Conservation Recommendations in the 2010 BO was to "enhance limestone forest and ravine forest areas on DoD land currently mapped as recovery habitat for the Guam Micronesian kingfisher, Mariana crow, and Mariana fruit bat by implementing landscape-scale measures to control invasive plants." The DON is going a step further and not only controlling invasive plants but also:

- installing ungulate exclusion fencing;
- active removal of ungulates (i.e. trapping, snaring, shooting) with the goal of eradication within the fenced areas; and/or
- propagation, planting, and establishment of dominant and rare species that are characteristic of native limestone forest habitats (e.g., *A. mariannensis, G. mariannae, F. prolixa, M. citrifolia, C. micronesica, W. elliptica, S. nelsonii, H. longipetiolata*, *T. rotensis*).

The degradation and loss of primary limestone and other forest habitats resulting from ungulate damage and invasion by alien plant species has substantially diminished the extent of habitat for fruit bats and other species in the Mariana archipelago.

DON will implement forest enhancement commensurate to the overall amount of habitat suitable for the recovery of the species impacted. When U&SI site work or a development project (Appendix A) is initiated, a commensurate amount of forest enhancement would begin. It is expected that approximately 1,072 acres of forest will need to be enhanced as part of the Project Description (Figure 2-13).

The DON initiated an ungulate management project as part of the 2010 BO as implementation of the Ungulate Management Plan was a general conservation measure intended to contribute to the recovery of listed species. The project was the installation of approximately 4,400 ft of coated chain link fence along Route 2A on the perimeter of NBG. The fence provides an ungulate exclosure for the 3,114 ac (1,260 ha) of the main base of NBG. The fencing project is intended to effectively close off Orote pennisula from any new ungulate incursions and only entry control gates will be left unfenced. These gates are manned twenty-four hours a day/seven days a week. The fencing project was initiated in 2013 and is complete.

In 2013, USDA initiated trapping efforts in accordance with the 2010 BO. The USDA trapping efforts, are on-going and is managed by JRM. Fence maintenance will periodically be conducted in the event storm damage or other influences (i.e., corrosion) dictate repair. The ultimate goal of the project is sustained suppression to levels that allow for forest regeneration and self-sustaining populations of native animals.

Figure 2-13. Forest Enhancement at Finegayan

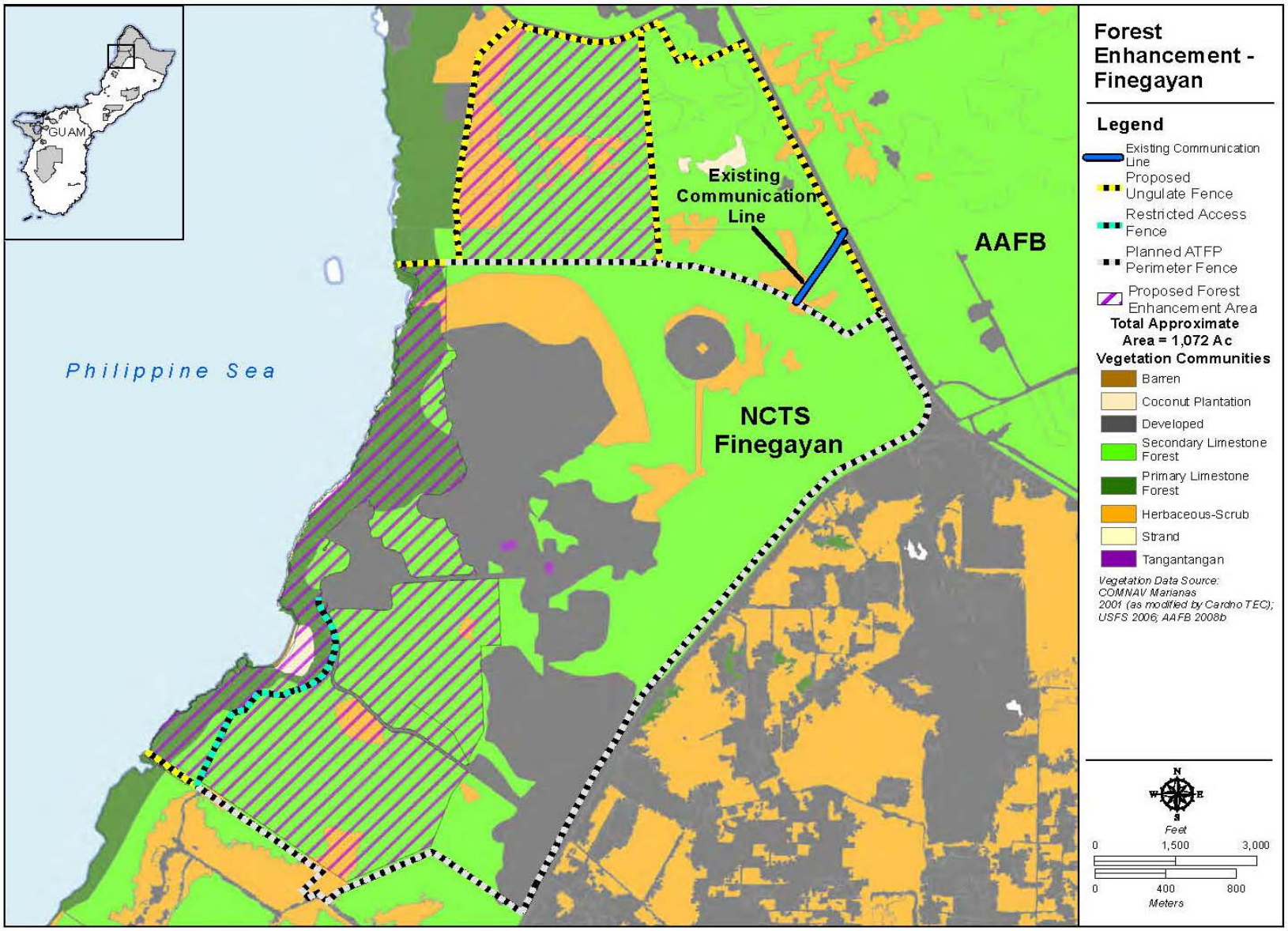
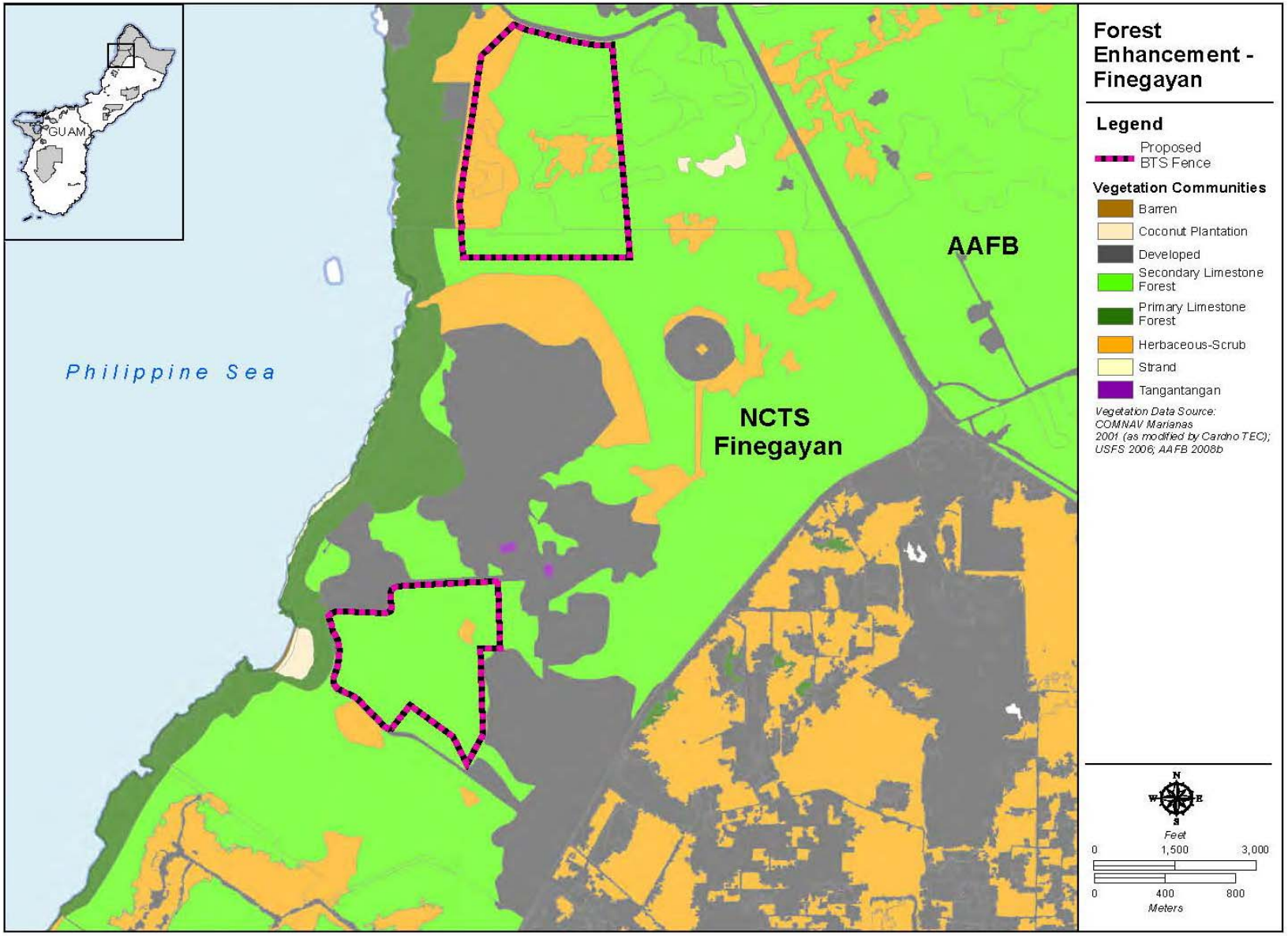


Figure 2-14. BTS Fence and Forest Enhancement - Finegayan



2.4.4 Serianthes Bracing

The one remaining adult *S. nelsonii* tree at NWF is in poor condition due to termites and rotting at the base. The tree is leaning which renders it more susceptible to snapping or toppling in the event of a catastrophic typhoon. Guide wires will be installed to support the tree at NWF thereby reducing the potential for its collapse.

In addition, the DON has included *S. nelsonii* in the list of species to be considered for propagation, planting, and establishment as part of the forest enhancement described in Section 2.4.3.

2.4.5 Sea Turtle Public Outreach

The DON, in cooperation with DAWR, has undertaken an educational program to inform military and civilian personnel about sea turtle nesting and the potential impacts to the species from nest disturbance, direct harassment of sea turtles (in the marine and terrestrial environment), beach disturbance, and other threats The DON has developed and distributed sea turtle conservation posters, tri-fold brochures and activity booklets for elementary school children. These educational materials have been distributed to local dive shops on Guam, and will continue to be used and refined throughout the construction period of the proposed relocation.

2.4.6 Mariana Fruit Bat Recovery Actions on Rota

In September of 2011, the DON awarded a cooperative agreement to the University of Montana for Mariana fruit bat recovery actions on Rota. The project focus and deliverables aligned with recovery actions contained within the Draft Revised Recovery Plan for the Mariana Fruit Bat (USFWS 2009a). Recovery actions supported by the University of Montana project included: (1) synthesizing recent research in order to update the recovery goals in the Recovery Plan, (2) conducting population genetics research using fruit bat fecal samples as a source of fruit bat DNA, (3) establishing a standardized monitoring protocol, and (4) encouraging education and involvement of local communities at multiple levels. This project was completed in June of 2013 (Mildenstein 2013).

The USFWS has indicated that the reintroduction of the currently extirpated species on Guam is reasonably certain to occur during the time frame of the Proposed Action, and as such, the DON will not plan continue with the implementation of this conservation measure but rather focus on conservation measures that improve habitat quality on Guam.

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CHAPTER 3
DESCRIPTION OF THE ACTION AREA AND THE LISTED SPECIES THAT MAY BE AFFECTED

3.1 ACTION AREA

The Action Area is defined as all areas that may be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. It encompasses the geographic extent of environmental changes (i.e., the physical, chemical and biotic effects) that will result directly and indirectly from the action. The 2010 BO described the Action Area as the area within which the action is likely to produce stressors that have direct or indirect adverse consequences to listed resources. The 2010 BO addressed the Action Area as DoD construction and training on Guam and Tinian. Due to the changes in the Proposed Action, the Action Area has changed and now only includes lands on Guam. The decision regarding training ranges on Tinian is not affected by the 2012 Roadmap Adjustments, and remains final and is not subject to re-analysis in the SEIS. DON intends to publish a combined Draft EIS and Overseas EIS (OEIS) for proposed CNMI Joint Military Training (CJMT) on the islands of Tinian and Pagan. Following completion of the CJMT NEPA process, the decision regarding proposed training ranges as evaluated in the CJMT EIS would supersede the 2010 ROD with regards to Tinian range projects. Consequently, the DON has deferred any implementation of the Tinian training ranges from the 2010 ROD pending the outcome of the CJMT EIS.

Key sources of information for this section include the Final SEIS, 2010 Final EIS; 2010 JGPO BO, the Joint Region Marianas (JRM) INRMP (JRM 2013), the Guam CWCS (GDAWR 2006), recovery plans (USFWS 1990a, 1993, 2005a and b, 2008a, 2009a), Federal Register (2004), and previous EISs, Environmental Assessments, BAs, and resulting USFWS BOs for recent actions on military lands on Guam. In addition, information from site-specific surveys conducted for the 2010 Final EIS (NAVFAC Pacific 2010a) and project-specific biological and wetland surveys for the SEIS (NAVFAC Pacific 2013a, 2013b, 2013c, 2013d) were used. Site-specific natural resources GIS data for the project areas were obtained from NAVFAC Pacific and NAVFAC Marianas as of April 2014.

3.2 MARIANA FRUIT BAT

Listing Status

The Guam population of the Mariana fruit bat was listed as endangered in August 1984 (USFWS 1984). In 2005, the USFWS reclassified the Mariana fruit bat from endangered to threatened status (USFWS 2005a). The reclassification was based on research indicating *Pteropus mariannus mariannus* is not a subspecies endemic only to Guam but the Guam population is part of a subspecies including bats on other islands that interact with each other (USFWS 2005). A five-year status review was completed in 2012 (USFWS 2012a) and a draft revised recovery plan for the Mariana fruit bat was completed in 2009 (USFWS 2009a).

Critical Habitat

In October 2004, approximately 376 ac (152 ha) of USFWS lands were designated as critical habitat for the fruit bat within the Ritidian Unit of the GNWR (USFWS 2004a).

Primary Constituent Elements (PCE)

In accordance with section 3(5)(A)(i) of the ESA and regulations at 50 CFR 424.12, in determining which areas to propose as critical habitat, the USFWS is required to consider those physical and biological

features that are essential to the conservation of the species and that may require special management considerations or protection. Such features are termed ‘‘primary constituent elements’’ and include, but are not limited to: space for individual and population growth and for normal behavior; food, water, air, light, minerals and other nutritional or physiological requirements; cover or shelter; sites for nesting and rearing of offspring; and habitats that are protected from disturbance and are representative of the historical, geographical and ecological distributions of the species.

In the final rule for designating critical habitat for the Mariana fruit bat, the USFWS identified the primary constituent elements required by the Mariana fruit bat for the biological needs of foraging, sheltering, roosting, and rearing of young as being found in areas supporting limestone, secondary, ravine, swamp, agricultural, and coastal forests composed of native and introduced plant species (USFWS 2004a). These forest types provide the primary constituent elements of:

(1) Plant species used for foraging, such as breadfruit, papaya, fadang, fig, kafu, coconut palm, and talisai; and

(2) Remote locations, often within 328 ft (100 m) of clifflines that are 260 to 590 ft (80 to 180 m) tall, with limited exposure to human disturbance and that contain mature fig, chopak, gago, pengua, panao, fagot, and other tree species that are used for roosting and reproductive activity.

Recovery Habitat

Unlike recovery plans or critical habitat which are discussed in the ESA and involve public notice and publication in the Federal Register, “recovery habitat” is a term that was defined in the 2010 BO by the USFWS to mean “habitat that is currently suitable to support the recovery of listed species.” For the fruit bat, the USFWS identified recovery habitat as including the following vegetation communities for foraging, roosting, and breeding: primary and secondary limestone forest, coconut plantation, ravine forest, and groves of ironwood (based on vegetation mapping by the U.S. Forest Service (USFS) (2006)). According to the 2010 BO, a total of 29,308 ac (11,860 ha) of Mariana fruit bat recovery habitat remains on Guam (Figure 3-1).

Threats

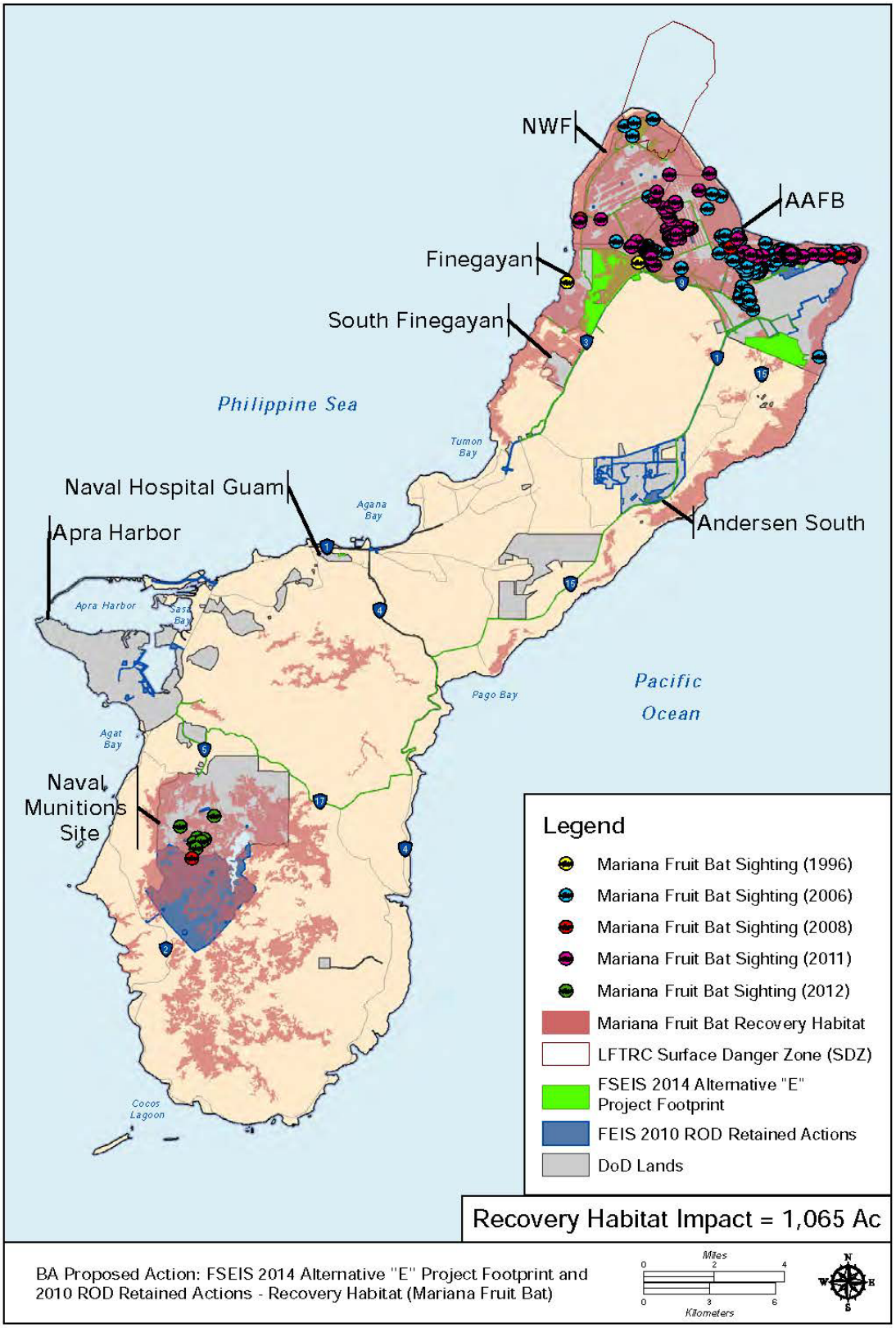
The primary threats to the Mariana fruit bat throughout its range are illegal hunting and habitat destruction by volcanic eruptions and man-made disturbances. Illegal hunting and predation from BTS are widely accepted as reasons for lack of fruit bat recovery on Guam (USFWS 2009a). Consumer demand remains the driving force for illegal hunting and has prevented the recovery of fruit bats in the southern CNMI (Brooke 2008).

Distribution

On Guam, the sighting of Mariana fruit bat was considered to be “not... uncommon” in 1920 (Crampton 1921 in USFWS 2009a). However, by 1931 bats were uncommon on Guam, possibly because the introduction of firearms led to more hunting (Coultas 1931). In 1958, the Guam population was estimated to number no more than 3,000. This estimate had dropped to between 200 and 750 animals by 1995.

Mariana fruit bat population estimates on Guam in 2006 indicated fewer than 100 individuals (Janeke 2006). In 2009, the number of fruit bats on Guam was estimated to be less than 50 individuals (USFWS 2009a). Of the estimated 6,610-6,930 total Mariana fruit bat individuals, fewer than 20 occur on Guam, with the remaining occurring within the CNMI (USFWS 2010a). Other than a few isolated periods of increase, fruit bats have been in long-term decline on Guam (USFWS 2009a), in response to a combination of threats.

Figure 3-1. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Mariana Fruit Bat)



Extensive surveys conducted throughout AAFB between December 2010 and December 2011 resulted in a conservative estimate of approximately 25 fruit bats (JRM *et al.* 2012a). Only 50 detections of individual bats were recorded during 84 station count surveys from March through September 2012, and no active fruit bat aggregation or colony site was discovered (JRM *et al.* 2012b). There were observations of single flying and (in a few cases) roosting fruit bats in three general regions on AAFB: the cliffline extending from above the Combat Arms Training and Maintenance (CATM) Range east to Pati Point; in or near the Munitions Storage Area (MSA); and in the vicinity of the Habitat Management Unit (HMU) (JRM *et al.* 2012a) (Figure 3-1). The most recent base-wide fruit bat counts were conducted on AAFB on July 3, 2014. The counts were coordinated by Dr. Tammy Mildenstein and there were approximately 90 observers at 50 survey stations. Less than 10 bats were sighted at six stations. The area covered represents 13% of the forested habitat on AAFB.

Between 1984-2003, the number of bats at Pati Point reached a high of 700 bats. This colony has undergone dramatic short-term fluctuations in the past indicating that members of the colony may be able to migrate easily between Rota and Guam (COMNAV Marianas 2001b). Surveys conducted from June 2007 through April 2008 recorded 31-54 individuals with an average of 40 (AAFB 2008d). Fifty-three survey counts at Pati Point colony site from 24 December 2010 to November 2011 had an average of 2.2 bats. Counts of solitary bats throughout the forest of AAFB did not locate other colonial roost sites. As of 2011, no new fruit bat colonies have been recorded anywhere on Guam (JRM 2012b and c). Tarague Basin is a major conduit for Mariana fruit bat travel between the main Pati Point colony and foraging areas at NWF, Ritidian Point, and portions of the AAFB. Recent surveys of the number of fruit bats at the Pati Point colony have indicated very low (less than 5 bats in 2011 (JRM 2012b and c)) attendance, indicating this colony site is no longer being used.

From 2010 through November 2013, there have been five reports of one to three fruit bats in flight at the GNWR. GNWR personnel believe that fruit bats may roost near Star Cave at Ritidian Point on GNWR property (Personal communication via email from Jennifer Cruce, GNWR to Anne Brooke, JRM, November 7, 2013).

The Haputo ERA contains some of the best remaining fruit bat habitat on the DON-managed lands (NAVFAC Marianas 2010a; JRM 2013). As fruit bats are known to travel 6-7.5 miles (10-12 km) to reach forage areas (USFWS 1990), it is possible that fruit bats from AAFB may occasionally use Finegayan, primarily forested areas adjacent to the Haputo ERA, for foraging, and possibly roosting. In 2008, during 10 observation days, one sighting was reported in the Haputo ERA and one in the northeastern portion of Finegayan (Brooke 2008). There are no known colonial roost areas at Finegayan.

In May and June of 2012 seven separate detections of a single Mariana fruit bat were recorded during overlook surveys conducted on six separate occasions at four locations throughout the proposed range areas on Naval Magazine (NAVMAG). It could not be determined whether these observations represented a single individual or multiple individuals. It is possible that all sightings were of the same individual fruit bat observed on different occasions or at different locations.

The Mariana fruit bat is rarely observed at NBG. One bat was sighted on NBG lands in 2008 during 90 hours of fruit bat surveys at 14 survey locations on or near NBG lands.

3.3 MARIANA CROW

Listing Status

The Mariana crow was federally listed as endangered on August 27, 1984 (USFWS 1984) and was consider extirpated from Guam in 2011 (USFWS 2013b). A five-year status review was completed in 2007 (USFWS 2005b) and a draft revised recovery plan for the Mariana crow was completed in 2005 (USFWS 2005b).

Critical Habitat

The USFWS designated 376 acres of critical habitat for the Mariana crow (*Corvus kubaryi*) on the island of Guam and approximately 6,033 ac (2,442 ha) on the island of Rota in the Commonwealth of the Northern Mariana Islands (USFWS 2004a) in October 2004.

Primary Constituent Elements

The primary constituent elements required by the Mariana crow for the biological needs of foraging, sheltering, roosting, nesting, and rearing of young are found in areas that support limestone, secondary, ravine, swamp, agricultural, and coastal forests composed of native and introduced plant species (USFWS 2004a). These forest types provide the primary constituent elements of:

(1) Emergent and subcanopy trees with dense cover for breeding such as fagot, pengua, ifit, ahgao, aabang, fig, yoga, and faniok;

(2) Sufficient area of predominantly native limestone forest to allow nesting at least 950 ft (290 m) from the nearest road and 203 ft (62 m) from the nearest forest edge and to support Mariana crow breeding territories (approximately 30 to 91 ac (12 to 37 ha)) and foraging areas for non-breeding juvenile crows; and

(3) Standing dead trees and plant species for foraging, maypunayo, breadfruit, coconut palm, fagot, pago, ifit, tangantangan, langiti, kafu, ahgao, fig, and yoga.

Recovery Habitat

According to the 2010 BO, only limestone forest and ravine forest are considered habitat that is currently suitable to support the recovery of listed species.

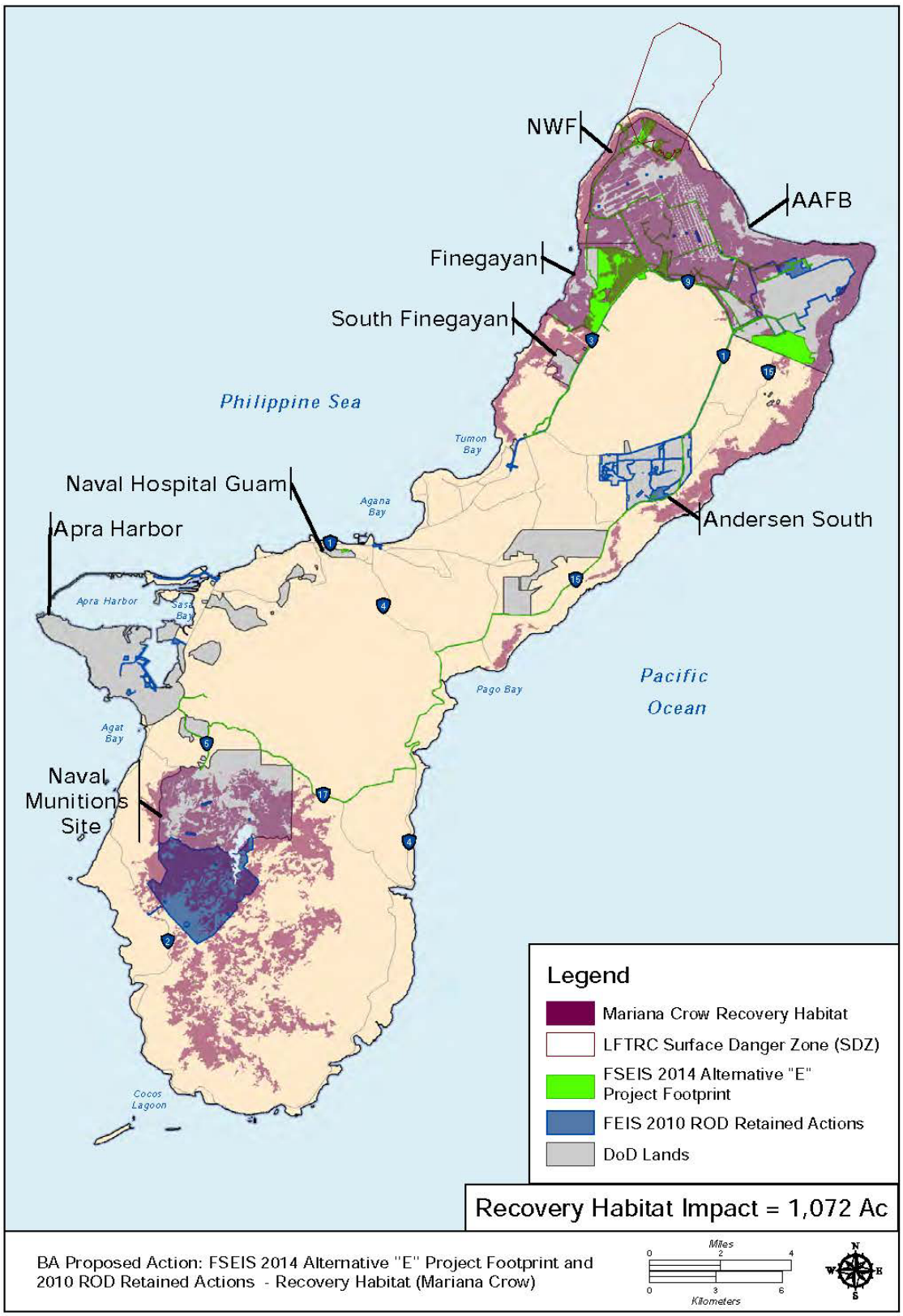
The USFWS estimated there were approximately 14,831 ac (6,002 ha) of potential recovery habitat for the Mariana crow in northern Guam and 11,819 ac (4,783 ha) in southern Guam (USFWS 2010a) (Figure 3-2). A total of 286 ac (116 ha) of recovery habitat currently exists within the 376-ac area designated as critical habitat for this species.

Threats

Primary threats to the Mariana crow throughout its range are habitat destruction and modification, predation by introduced predators such as cats, rats, mangrove monitor lizards (*Varanus indicus*), and BTS, human persecution, typhoons, and reproductive and small population problems (USFWS 1984, USFWS 2005b).

Brown treesnake predation is believed to be the overriding factor in the decline of Mariana crow on Guam (USFWS 2005b). Habitat degradation due to grazing by feral ungulates and range expansion of invasive plants are also factors (USFWS 2005b).

Figure 3-2. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Mariana Crow)



Distribution

The Mariana crow is considered extirpated in the wild on Guam (USFWS 2013b). The closest population of crows is on the island of Rota, approximately 56 miles (90 km) north of Guam.

3.4 GUAM MICRONESIAN KINGFISHER

Listing Status

The Guam Micronesian kingfisher was listed as endangered in 1984 (USFWS 1984), and was considered extirpated from the wild by 1988 (Wiles et al. 2003). A draft revised recovery plan for the Guam Micronesian kingfisher was completed in 2009 (USFWS 2008a). A five year status review was completed in March of 2012 (USFWS 2012a).

Critical Habitat

Critical habitat for the Guam Micronesian kingfisher was proposed in June of 1991 (USFWS 1991a) and withdrawn in April of 1994 (USFWS 1994). In October 2004, approximately 376 ac (152 ha) of USFWS lands were designated as critical habitat for the Guam Micronesian kingfisher within the Ritidian Unit of the GNWR (USFWS 2004a).

Primary Constituent Elements

In the 2004 final rule for designating critical habitat for the Guam Micronesian kingfisher, the USFWS identified the primary constituent elements required for the Guam Micronesian kingfisher for the biological needs of foraging, sheltering, roosting, nesting, and rearing of young as being found in areas that support limestone, secondary, ravine, swamp, agricultural, and coastal forests containing native and introduced plant species (USFWS 2004a). These forest types include the primary constituent elements of:

(1) Closed canopy and well-developed understory vegetation; large (minimum of approximately 17 in (43 cm) dbh), standing dead trees (especially faniok, umumu, breadfruit, fig, and coconut palm); mud nests of *Nasutitermes* spp. termites; and root masses of epiphytic ferns for breeding;

(2) Sufficiently diverse structure to provide exposed perches and ground surfaces, leaf litter, and other substrates that support a wide range of vertebrate and invertebrate prey species for foraging kingfishers; and

(3) Sufficient overall breeding and foraging area to support kingfisher territories of approximately 25 ac (10 ha) each.

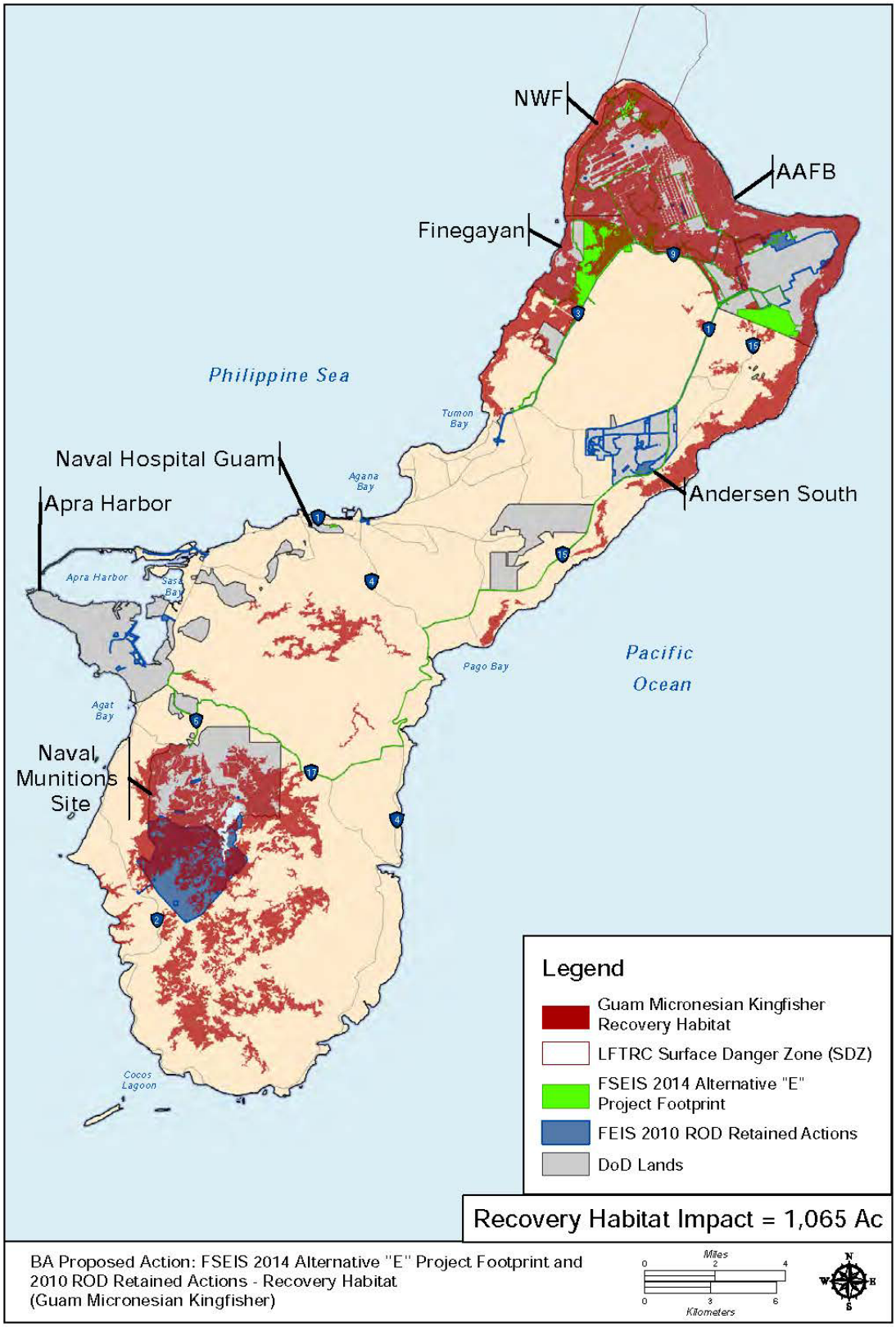
Recovery Habitat

According to the 2010 BO, limestone forest, ravine forest, coconut plantation, and palma brava grove are considered likely habitat to support Guam Micronesian kingfisher recovery. A total of 286 ac (116 ha) of recovery habitat currently exists within the 376-ac area designated as critical habitat for this species. A total of 29,310 ac (11,861 ha) of Guam Micronesian kingfisher recovery habitat remains on Guam (Figure 3-3).

Threats

When the kingfisher was first listed in 1984, disease was believed to be the primary threat to the species on Guam (USFWS 1984). Since that time predation by the BTS has been identified as the primary threat (Savidge 1987).

Figure 3-3. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Guam Micronesian Kingfisher)



Primary threats to kingfishers include: low productivity in captive propagation; incremental habitat loss due to development and fire; habitat degradation from feral ungulate browsing and trampling; and predation risk from BTS (USFWS 2008a). Currently, the high density of BTS is the primary factor preventing the kingfisher's survival and recovery on Guam.

Distribution

The Guam Micronesian kingfisher was considered extirpated from the wild by 1988 (Wiles et al. 2003). The species is only known to occur in mainland zoos.

3.5 GUAM RAIL

Listing Status

The Guam rail was emergency listed as endangered on April 11, 1984. On August 27, 1984, the final rule listing the Guam rail as endangered was published (USFWS 1984). A non-essential experimental population was proposed on Rota on June 19, 1989 and the final rule published on October 30, 1989. A recovery plan covering native forest birds of Guam and Rota was prepared in 1990 (USFWS 1990b).

Critical Habitat

There is no critical habitat designated for the Guam rail.

Recovery Habitat

The Guam rail prefers edge habitats, especially grassy or secondary vegetation areas which provide good cover; mature forest is deemed only marginal for the Guam rail (USFWS 1990b). Scrub forest, other shrubs and grasses, and urban cultivated are considered primary Guam rail habitat because they include shrubby edge habitat.

The 2010 BO estimated 24,698 ac (9,995 ha) of Guam rail recovery habitat available in the north of Guam and 24,866 ac (10,063 ha) in the south (Figure 3-4).

Threats

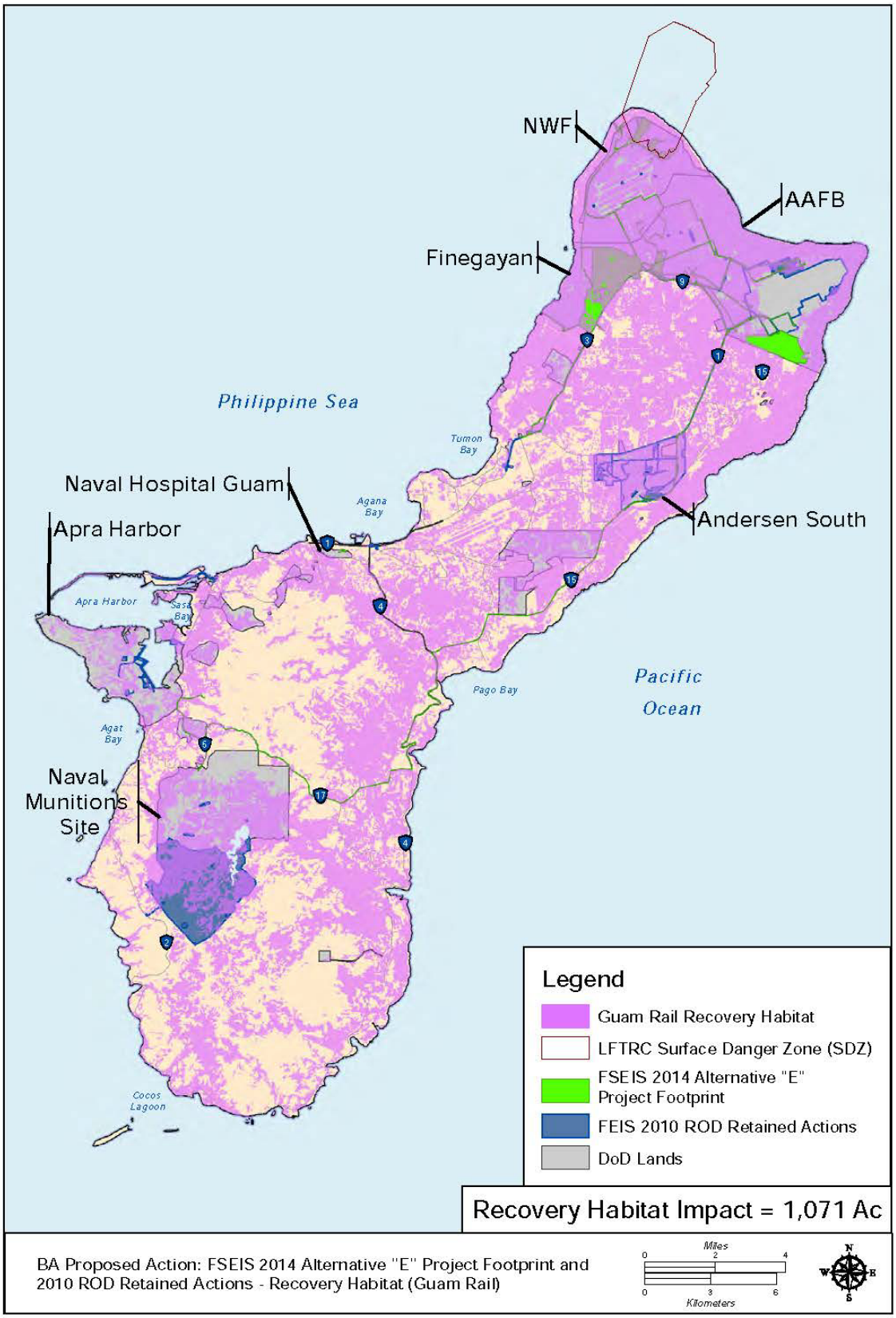
While the loss of habitat likely played a part in the extirpation of the Guam rail from Guam, several species of predators have been introduced to the Mariana Islands including feral dogs, cats, three species of rats (*Rattus exulans, R. rattus, and R. norvegicus*), a monitor lizard, and the BTS. However, the primary reason for extirpation is believed to be from predation by cats and BTS. These are the two known threats that preclude the successful reestablishment of the Guam rail on Guam (USFWS 1990).

Distribution

The Guam rail was believed to have been extirpated in the wild on Guam by 1987 (Wiles et al. 1995) and exists primarily in captivity on Guam and in mainland zoos.

The Cocos Island Resort, Guam Department of Agriculture, and USFWS entered into an agreement to create a safe harbor for the Guam rail on Cocos Island in 2009. In November 2010, 16 Guam rails were released on Cocos Island, a 81 acres (33 ha) atoll one mile off the coast of the southern tip of Guam, as part of its reintroduction two decades after its extinction in the wild.

Figure 3-4. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Guam Rail)



3.6 MARIANA GRAY SWIFTLET

Listing Status

The Mariana gray swiftlet was listed as endangered on August 27, 1984. A five-year status review was completed in 2013 (USFWS 2013c). A recovery plan for Mariana gray swiftlet was completed in September of 1991 (USFWS 1991b).

Critical Habitat

No critical habitat rules have been published for the Mariana gray swiftlet.

Recovery Habitat

The 2010 BO did not identify recovery habitat for Mariana gray swiftlet.

Threats

The 1991 recovery plan for the Mariana gray swiftlet stated "Current information documents the decline of Mariana gray swiftlet populations on the islands of Guam, Rota, and possibly Saipan. Yet for none of these islands is there direct evidence of factors causing the recent decline."

The 2010 BO stated "The restricted distribution of Mariana swiftlets, along with its small population size and dependence on caves, makes the species vulnerable to threats. The causes for the decline of Mariana swiftlets are mostly unknown, but human disturbance, predation, pesticides, and disease have all been hypothesized as having a role. Swiftlets have been documented to flush or fail to enter their caves when humans are near or within their caves (Wiles and Woodside 1999). Their sensitivity to human presence has resulted in injuries to chicks and adults and could result in damage to eggs (Wiles and Woodside 1999). Sources of human disturbance have included Japanese soldiers during World War II, guano mining, hunters, hikers, and vandalism. While the introduction of brown treesnake is known to have caused the extirpation of many bird species in Guam and CNMI, it is not known whether it has significantly affected swiftlets. Brown treesnake predation on Mariana swiftlets is considered to be a regular event and only those birds able to find nest or roost sites on high, smooth walls and ceilings are able to avoid snake predation. The use of pesticides such as DDT has been suspected of causing the decline of swiftlet populations on Guam (Diamond 1984, p. 452), but the concentrations of pesticide residues found in swiftlet guano have not supported this hypothesis (Grue 1985, p. 301). On Saipan, non-native cockroaches are known to destroy swiftlet nests by consuming the saliva that holds the nests to the walls or ceilings (Cruz et al. 2008, p. 242). Savidge (1986, p. 9) investigated the role of disease in the decline of birds on Guam and found that there is no evidence that it has played a significant role. The typhoons that frequently occur in the area may cause periodic declines in swiftlet populations, but are not expected to threaten the species as a whole since the species has survived numerous such events during its evolutionary history (USFWS 1991b, p. 22)."

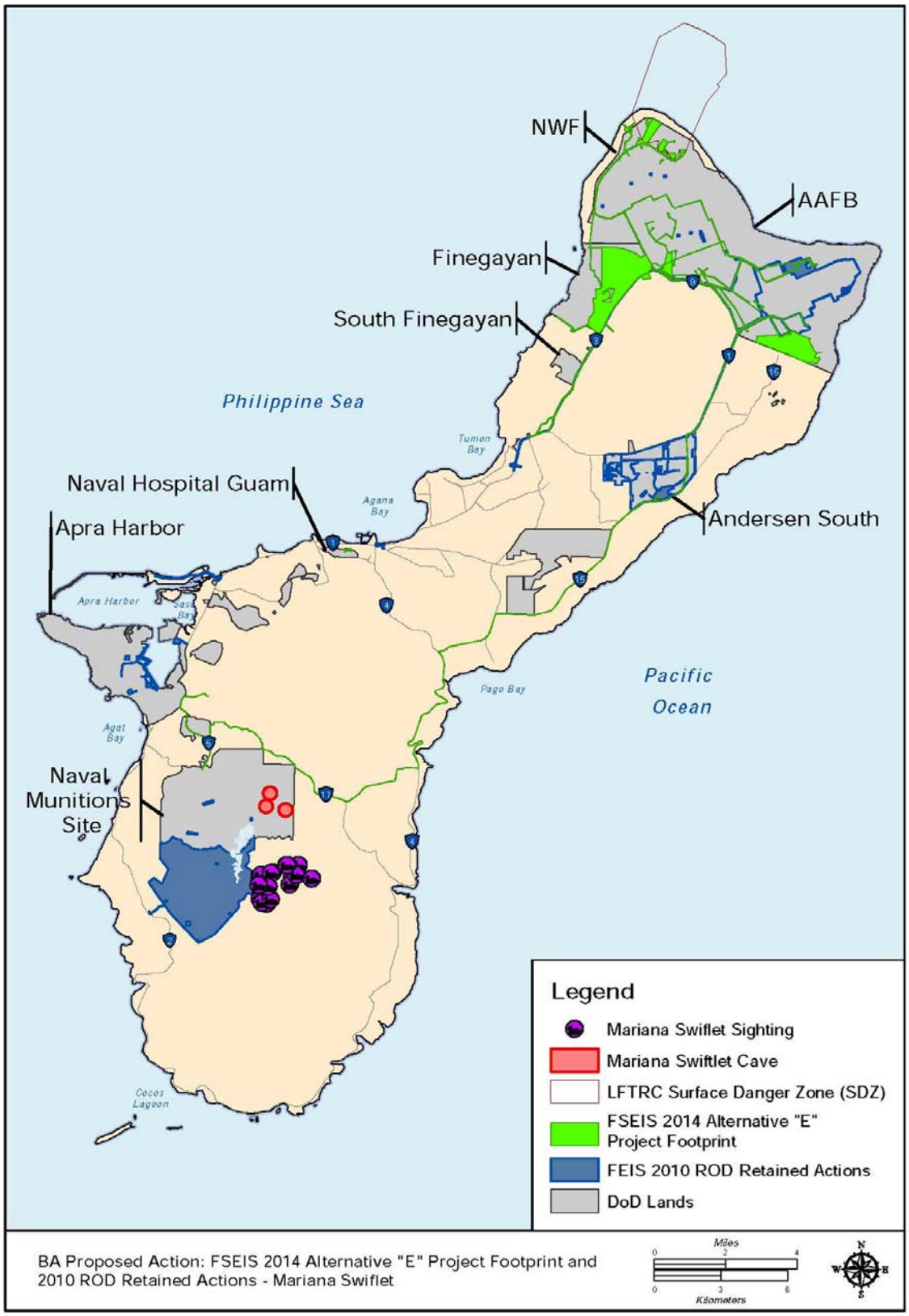
Distribution

The Mariana gray swiftlet is endemic to Guam and the four southern islands of CNMI (Cruz et al. 2008). A population also became established on Oahu, Hawaii, between 1962 and 1965 (Wiles and Woodside 1999, p. 57). Most historical information on the species comes from Guam, where it was reported as being common and the third most abundant species seen during roadside counts, but declined to approximately its current levels by the late 1970s (USFWS 1991b). The total number of Mariana gray swiftlets occurring within its historical range is approximately 6,800 individuals and it currently occurs on Guam (in three known caves within the NMS, Aguiguan (in nine known caves), and Saipan (ten known caves), and is considered extirpated from Tinian and Rota.

Mariana gray swiftlets nest and roost in caves and leave the caves during the day to forage over a wide variety of terrain and vegetation, favoring ridge crests and open grassy areas where they capture small insects while flying (USFWS 1991b). There are only three known nesting/roosting caves (Mahlac, Fachi, and Maemong) on Guam for this species and they are located in the northern NAVMAG (Figure 3-5). The number of Mariana gray swiftlets at Mahlac cave fluctuates around 1,000, while the number at Maemong cave from 2010 to 2012 ranged between 40 and 126, and at Fachi cave have fluctuated between a low of 3 (2011) and a high of 172 (2009) (Brindock 2012). A nest/roost cave previously used by Mariana gray swiftlets is known from Ritidian Point, but this cave was abandoned by the late 1970s (USFWS 1991b). Biological surveys conducted in 2008 and 2009 in support of the 2010 Final EIS and in 2012 and 2013 in support of this SEIS, did not record any incidental observations of Mariana gray swiftlets (NAVFAC Pacific 2010, 2013b; UoG 2014).

During June and July 2012, surveys within the proposed non-federal lands range area near NAVMAG observed 1-11 Mariana gray swiftlets at multiple locations from four survey stations (NAVFAC Pacific 2013a).

Figure 3-5. FSEIS and 2010 ROD Related Actions – Mariana Gray Swiftlet Locations



3.7 SERIANTHES NELSONII

Listing Status

Serianthes nelsonii was listed as threatened on March 4, 1987. A five-year status review was completed in 2010 (USFWS 2010c). A recovery plan for *Serianthes nelsonii* was completed in February of 1994 (USFWS 1993).

Critical Habitat

There is no critical habitat designated for the *Serianthes nelsonii*.

Recovery Habitat

The 2010 BO did not include recovery habitat for *Serianthes nelsonii*. However, as part of the 2010 consultation, the USFWS provided the DON with digital files depicting recovery habitat for *Serianthes nelsonii.* The digital files indicate there are approximately 11,668 ac (4,722 ha) of habitat on Guam suitable for *Serianthes nelsonii* (Figure 3-6). To date, the recovery plan for the species has not been updated to reflect the criteria for recovery of the species.

Distribution

There is only one known remaining mature seed-bearing tree on Guam and it is in the NWF area above Ritidian Point within primary limestone forest (Figure 3-7).

In 2012, JRM funded a study by UoG to monitor the mature seed bearing tree. The study indicated the tree is leaning much more in recent years, which renders it more susceptible to snapping or toppling in the event of a catastrophic typhoon. Mealy bug infestations were routinely evident upon inspection of leaf litterfall. *Eurema* adult butterflies were persistently observed within the canopy (U.S. Navy 2014). The UoG study monitored seedling emergence and growth beneath the mature *S. nelsonii* tree. Of the 488 seedlings that emerged and died during the course of the project, only four seedlings exhibited lifespan greater than 200 days. Past reports have indicated deer browsing was the major cause of *in situ* seedling death. Strict maintenance of the functional exclusion fence was sustained throughout the study, so deer or pig damage could not have been responsible for the mortality of the 488 seedlings that emerged and died during the study. Also, there was no seasonal pattern that could explain the extraordinary lifespan of these four seedlings.

Two outplanted *Serianthes* saplings are located in the Tarague basin area approximately 4 miles (6.4 km) east of the proposed LFTRC and six outplanted *Serianthes nelsonii* saplings are located in the GNWR that are approximately 1,640 ft (500m) west of the one known remaining mature seed-bearing tree on Guam (J. Schwagerl, personal communication, June 23, 2014).

Figure 3-6. FSEIS and 2010 ROD Related Actions – Recovery Habitat (Serianthes nelsonii)

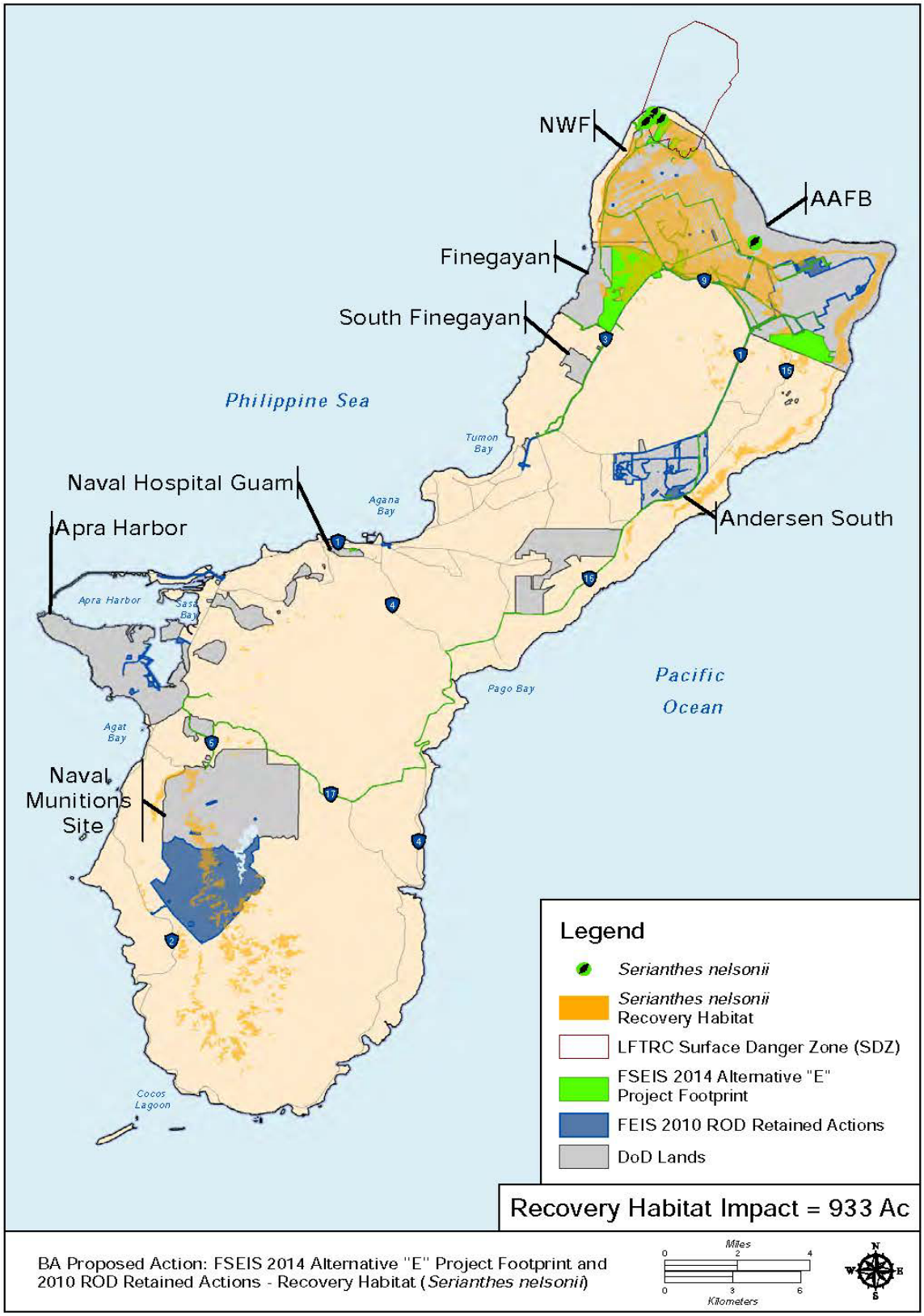


Figure 3-7. Mature Serianthes nelsonii (Photo by Coralie Cobb, May 2014)

3.8 GREEN AND HAWKSBILL SEA TURTLES

Listing Status

The green sea turtle was listed as threatened on July 28, 1978. The hawksbill sea turtle was listed as endangered June 2, 1970 (USFWS 1970). Recovery plans for the green and hawksbill sea turtle were completed in 1998 (USFWS 1998a and b).

Critical Habitat

There is no critical habitat designated for the green or hawksbill sea turtles on Guam.

Recovery Habitat

The 2010 BO did not include recovery habitat for green or hawksbill sea turtles.

Threats – Terrestrial

Threats to the green sea turtle on nesting grounds are representative of those also faced by hawksbill sea turtles. Storm events, including typhoons, may destroy nests because of flooding or piling of eroded sand on the nest site. Beach erosion due to wave action may decrease the availability of suitable nesting habitats and result in a decline in the nesting rate. A number of non-native and native predators dig into nests and prey upon incubating eggs, while some predators, including birds, may take hatchlings just prior to or during their emergence from nests.

Human crowding of nesting beaches can disturb nesting females and prevent laying of eggs. Flashlight use, beach fires, and artificial lighting on human structures may deter females from coming up onto a beach or may disorient hatchlings as they emerge from nests and try to find the sea (Witherington and

Martin 1996). Emerging hatchlings may respond to artificial lighting by moving in the wrong direction (*misorientation*) or becoming disoriented and moving in circles. Both behaviors can result in hatchling mortality through exhaustion, dehydration, predation, and other causes (Mann 1977; Witherington and Martin 1996).

An increased human presence may lead to an increase in the presence of domestic pets (which can depredate nests) and may lead to an increase in litter (which may attract wild predators). Trampling can increase sand compaction, which may damage nests or hatchlings. Humans may also introduce exotic vegetation in conjunction with beach development that can overrun nesting habitat or make the substrate unsuitable for digging nest cavities.

One of the most substantial threats to nesting sea turtles in the Pacific Islands remains the illegal poaching of adults and eggs (NMFS and USFWS 1998a). The direct harvest of adult nesting females can increase the rate of local extinction. Harvesting of eggs reduces the chance that recruitment will replace the reduced breeding population.

Distribution

As described in the 2010 Final EIS, green sea turtles forage in offshore waters and nest on beaches at AAFB. The majority of nesting by this species occurs in northern Guam. Historically, the EOD beach at AAFB has one of highest incidents of sea turtle nesting.

Green sea turtles are known to nest on the following Guam beaches: Waterfront Annex of NBG Kilo Wharf area, Spanish Steps, AAFB (Tarague Beach, Sirena Beach, Pati Point), Guam National Wildlife Refuge, Haputo area (Wusstig 2009, pers. comm.; Grimm and Farley 2008). Nesting activity on Guam occurs throughout the entire year with a peak in nesting between April and July (Grimm and Farley 2008).

The green sea turtles potentially nest along the Haputo ERA beach. Two suspected nest attempts and two false crawls were documented between 2008 and 2010 at Haputo Beach (Grimm and Farley 2008). No sea turtle activity was observed at Haputo beach during 51 beach surveys from October 2010 through August 2012 (NAVFAC Marianas 2011; Brindock 2012). Green sea turtle nesting is documented on AAFB at Tarague.

Between 1991 and 1994, hawksbill sea turtles nested in Sumay Marina, Guam, during varying months including October, December, February, and March (Wusstig 2009, pers. comm.). On Guam, the population is thought to be declining, and fewer than ten females are expected to nest per season (NMFS and Service 2007b). Hawksbill sea turtles are frequently sighted in the near-shore waters surrounding Guam (Grimm and Farley 2008). Hawksbill sea turtles were reported nesting in June and July at Tarague Beach, Guam; however, this is based on only one year of data (Wusstig 2009, pers. comm.). It has been observed offshore of Finegayan but there have been no known nesting attempts by this species at Haputo Beach (JRM 2013). Green sea turtle nesting is documented on the GNWR in the area of the proposed SDZ for the LFTRC. The hawksbill sea turtle has not been definitively determined to nest on Guam in recent years (JRM 2013).

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CHAPTER 4 ANALYSIS OF POTENTIAL EFFECTS TO FEDERALLY LISTED SPECIES

4.1 APPROACH TO ANALYSIS

This chapter presents an analysis of potential direct and indirect effects on federally listed species, critical habitat and habitat suitable for recovery of listed species from implementation of the Proposed Action. Potential activities that may affect such species, critical habitat and habitat suitable for recovery include construction and operation of facilities and ranges. Direct effects are the direct or immediate effects of the project on the species or its habitat. Direct effects resulting from the Proposed Action including the effects of interrelated actions and interdependent actions. Indirect effects are those that are caused by the Proposed Action and are later in time, but still are reasonably certain to occur (e.g., attraction of predators due to development and human presence). All direct and indirect project effects on listed species, critical habitat and habitat suitable for recovery have been further classified and evaluated based on their anticipated longevity (i.e., temporary or permanent effects). Effects of the action under consultation are analyzed together with the effects of other activities that are interrelated to, and interdependent of, that action. Interrelated actions are those that are part of a larger action and depend on the larger action for its justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

As they relate to the federally listed species, critical habitat and habitat suitable for recovery of federally listed species considered in this BA, direct and indirect effects from proposed activities within the Action Area have been evaluated herein based upon: (1) an understanding of the methods and equipment that would be used during construction and operation of facilities, (2) knowledge of the potential for such methods and equipment to disturb the natural resources on which the subject species depend, and (3) awareness of the types of effects that have resulted from similar actions in the past.

Stressors of the Proposed Action

Stressors associated with proposed construction and operation of facilities associated with the Proposed Action were identified based on previous consultations, particularly the formal consultation process for the MIRC EIS/OEIS and the JGPO FEIS and resulting BO's.

4.2 POTENTIAL EFFECTS TO THE MARIANA FRUIT BAT

Construction Noise

Construction noise is generated by the use of heavy equipment on job sites and is short-term in duration (i.e., the duration of the construction period). Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. For a single point source, like a construction bulldozer, the sound level decreases by approximately 6 decibels (dBs) for each doubling of distance from the source. Sound that originates from a linear, or 'line' source, such as a passing aircraft, attenuates by about 3 dBs for each doubling of distance where no other features such as vegetation, topography, or walls absorb or deflect the sound. Depending upon their nature, the ability of such features to reduce noise levels varies.

Among mammals, bats are one of the orders that has the most diverse hearing and vocalization ranges. This is attributable to the fact that some bats use echolocation, which is comprised of high frequency sound, to forage and navigate while other bats do not use echolocation and communicate through mid-frequency sound. Bats in the genus Pteropus, including the Mariana fruit bat, do not use echolocation.

There is less scientific literature on the hearing and vocalizations of non-echolocating bats, which often eat fruit or blossoms. From the limited reporting in the literature it appears that these species tend to fall within the same functional hearing group, which can be generally described as being most sensitive to frequencies between 10 and 20 kHz, insensitive to frequencies below 1 kHz, and able to detect frequencies 40 kHz or greater (Calford, Wize et al. 1985, Calford and McAnally 1987, Heffner, Koay et al. 2006).

Figure 4-1 provides the audiogram for two species of *Pteropus* and humans. It is clear from the audiogram that the flying foxes do not have the lower frequency hearing capabilities that humans exhibit. Within the range of approximately 4 kHz to just under 20 kHz that they overlap with humans, the bats have more sensitive hearing than humans. The Mariana fruit bat is expected to have an audiogram similar to the two bat audiograms in Figure 4-1.

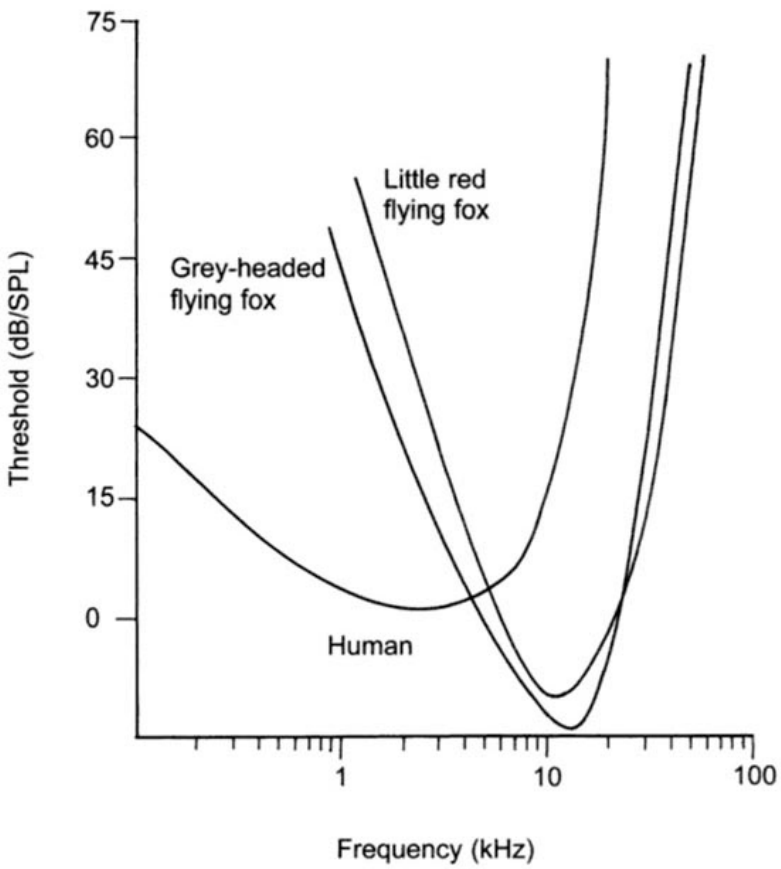


Figure 4-1. Audiogram of Little Red Flying Fox and Grey-Headed Flying Fox

The audiogram of little red flying fox *(Pteropus scapulatus)* and the grey-headed flying fox (*Pteropus poliocephalus*) compared to human hearing. The y-axis is a standard measure of hearing sensitivity. The higher the value the less sensitive the receiver is to that frequency (a louder volume is necessary to hear that particular frequency). Figure is taken from Hall and Richards (2000).

Construction projects will be temporary and localized within existing noise contours that range from 60 to 85 dB day-night average sound level.[1] No direct impacts to the Mariana fruit bat are anticipated as a result of construction noise related impacts associated with the Proposed Action because no increase of noise in the environment is anticipated.

[1] The day-night average sound level (DNL) is the A-weighted equivalent sound level for a 24 hour period with an additional 10 dB imposed on the equivalent sound levels for night time hours of 10 p.m. to 7 am. The noise between the hours of 10 p.m. and 7 a.m. is artificially increased by 10 dB. This noise is weighted to take into account the decrease in community background noise of 10dB during this period.

Construction Lighting

Bats are nocturnal animals and are adapted to low-light conditions. This means that some bat species can find artificial lighting disturbing. It is not known if the Mariana fruit bat is disturbed by light.

No proposed or existing facilities are known to be used by roosting bats or are adjacent to areas used by roosting bats. However, if it is considered necessary to illuminate facilities known to be used by roosting bats or adjacent to roosting bats, hooded lights will be used.

No direct impacts to the Mariana fruit bat are anticipated as a result of construction lightings because none of the construction projects which have the potential to affect Mariana fruit bat roosts will use night-time lighting.

Operations

The effect on the Mariana fruit bat of ongoing and increased noise resulting from increased jet aircraft and helicopter use of the main runways at AAFB was analyzed in the ISR Strike BO (USFWS 2006). In that consultation, the USFWS expected that noise effects would adversely affect the Mariana fruit bat to the extent that the nearby Pati Point colony would be abandoned by the 21 bats estimated to remain there in 2006. USFWS determined that fruit bats relocating from Pati Point to other, less-protected areas on the island likely would be shot opportunistically by hunters (USFWS 2006). In the ISR Strike BO, the USFWS concluded that the remaining fruit bats on Guam would be taken as a result of the Proposed Action, but that this incidental take would not jeopardize the continued overall existence of the Mariana fruit bat (USFWS 2006).

In the 2010 JPGO BO, the USFWS concluded that the adverse impacts of noise caused by the Proposed Action on the Mariana fruit bat at Pati Point on AAFB are expected to be substantial. "We believe the current roost site in the Natural Area at Pati Point on AAFB will likely be abandoned by the few bats remaining there as a result of the Proposed Action." The BO stated "The proposed JGPO project will increase jet traffic by approximately 25% and will approximately double the number of helicopter operations. …Any remaining bats at the Pati Point-area colony are likely to abandon that site as a result of project-related noise. This is because: (a) the increase in aircraft operations will further reduce the quality of the current site for normal roosting by further increasing bat activity levels throughout the day; (b) alternate sites of sufficient quality are available to the west and northwest of Pati Point and on the Island of Rota; and (c) the current colony site, and other roost sites, have been abandoned in the past because of human disturbance and other factors. Because noise from the ISR Strike BO and this BO [2010] will occur contemporaneously, it would not be possible to attribute the take to a single project."

As stated in Section 3.2, surveys of the Pati Point colony have indicated very low (less than 5 bats in 2011) attendance, indicating this colony site is no longer being used. There have been adverse effects to the Pati Point colony, however the decline of the colony is not due to noise from ISR Strike or JGPO aircraft (noise) operations as both programs have been delayed in implementation.

In addition to aviation training, ground-based training occurs for force protection using pyrotechnics, ground burst simulators, smoke grenades, and 40-pound cratering charges. Noise levels from these operations are within Noise Zones 2 and 3 and are confined within NWF. These noise events are dominated by the demolition charges which are impulsive sounds and generate C-weighted day-night levels of less than 62 C-weighted decibels at the boundary of NWF. The noise modeling results are shown on Figure 4-2. The Zone 2 noise contours cover approximately 48 onshore acres (19 ha) beyond the boundaries of DoD land at NWF or DOI land onto private property near the entrance to the Wildlife Refuge and Jinapsan Beach.

Critical Habitat

The proposed area for the new GNWR administration buildings, visitor's center, associated roads and parking lot contains 12 acres (5 ha) of primary limestone forest supporting both PCEs for fruit bat critical habitat. Noise and disturbance-related construction impacts would be temporary in nature. The proposed 12-acre (5-ha) construction area is already subject to daily human disturbance due to aircraft operations and other DoD activities at AAFB, and its proximity to the access road to the GNWR, adjacent beaches, and private property to the southwest.

The area within the southwestern portion of the critical habitat area, adjacent to the GNWR boundary, would be used for the relocation of the existing GNWR administration buildings and visitor center that are currently located to the northeast, near Ritidian Point. Two additional areas near Ritidian Point in the center of the critical habitat area are developed areas containing the existing GNWR administrative buildings, roads, and parking lots. In accordance with the final rule designating critical habitat (USFWS 2004a), developed areas were not designated critical habitat; therefore, proposed demolition activities within these two areas would not affect critical habitat.

Although new construction of the replacement GNWR facilities would directly impact 12 acres (5 ha) of designated critical habitat, the remaining critical habitat would remain functional (or retain the current ability for the PCEs to be functionally established) to serve the intended conservation role for the fruit bat. Accordingly, given the above, construction impacts would not appreciably diminish the value of the critical habitat for both the survival and recovery of the Mariana fruit bat.

Additional potential impacts to Mariana fruit bat critical habitat could occur during temporary construction activities (e.g., noise, lighting, and general human disturbance) and operations associated with the proposed ranges at NWF that would be adjacent to critical habitat. DON requested a Special Use Permit from the GNWR to conduct an experiment to measure and characterize small-caliber noise levels from live-fire and simulated fire testing on the NWF portion of AAFB. The intent was to gather data to support the analysis of potential environmental impacts resulting from the proposed construction and operation of the LFTRC at NWF. However, the GNWR denied the request citing the DON's proposed use as presented in the "Test Plan: NWF Noise Study" appeared inconsistent with law, regulations, and policies for administering the National Wildlife Refuge System and inconsistent with the wildlife conversation purposes of GNWR. The DON developed an alternate plan to study ambient noise at NWF-AAFB. Ambient noise was recorded at three NWF-AAFB locations between April 15-22, 2014. One site was at the edge of the cliff overlooking the GNWR approximately in line with the with the MPMG range, a second cliff edge location was at Ritidian Point and the third location was approximately 200 meters back from Ritidian Point along the cliff edge facing west-north west in the direction of the GNWR, the access road and northwester most portions of private property at Urunao. Professional-grade Larsen Davis model 831 sound level meters were used to make the sound measurements. During the sampling period there was a persistent noise floor at the three sites that was above 65 dB a large percentage of the time. Of the three sampling sites, the location within the mature limestone forest had the highest ambient noise levels. At this location, the overall unweighted noise level was virtually never below 50 dB and above 65 dB almost 100% of the time on some days (NAVFAC PAC 2014).

In the October 28, 2004 Federal Register designating critical habitat for the Mariana fruit bat, Guam Micronesian kingfisher and the Mariana crow on Guam, the comments questioned why the USFWS had not addressed the adverse impacts of jet noise on fruit bats and birds. The USFWS concluded that the presence of auditory or visual human disturbances does not affect the presence of the primary constituent elements used to define critical habitat.

Implementation of BMPs (e.g., installation of hooded lights in the vicinity of fruit bat critical habitat) will be used to the maximum extent possible to avoid and minimize the illumination of forest and critical habitat.

In conclusion, the 364 acres (147 ha) of remaining critical habitat would remain functional to serve the intended conservation role for the species based on the USFWS's December 9, 2004 interim guidance to USFWS biologists conducting Section 7 consultations and the application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act (USFWS 2004b).

Recovery Habitat

In the 2010 BO, the USFWS acknowledged that "we have insufficient data to estimate with confidence how much forest is necessary to support fruit bat recovery." However, the USFWS has identified approximately 29,308 ac (11,860 ha) of habitat on Guam as suitable for the recovery of the Mariana fruit bat (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

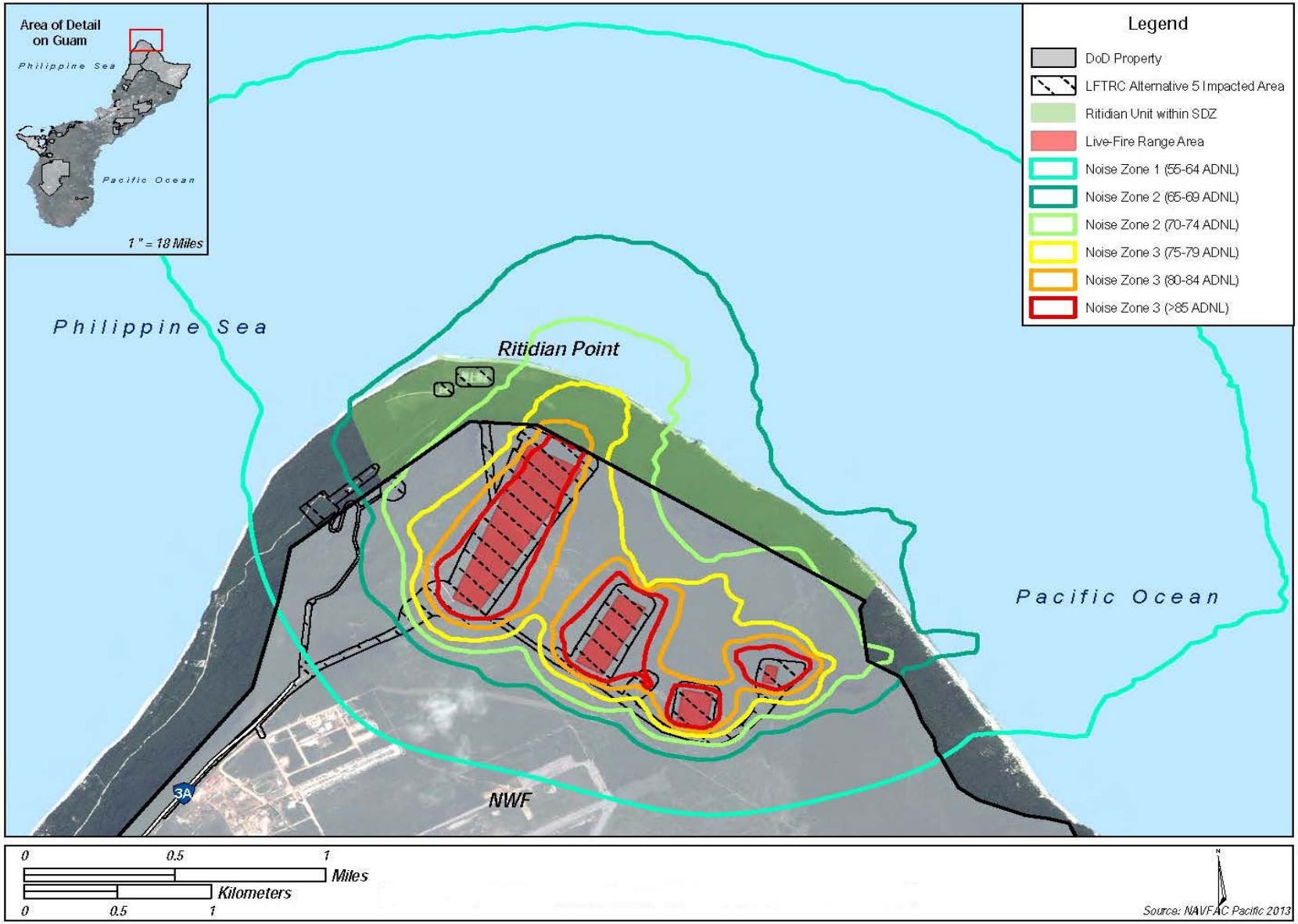
The 2010 BO estimated 1,524 acres of habitat suitable for the recovery of the Mariana fruit bat would be lost due to the Proposed Action (1,520 acres in the north and 4 acres in the south). In the 2010 BO, the USFWS concluded that the effects of the subject action, taken together with cumulative effects, are not likely to appreciably reduce the likelihood of both the survival and recovery of the Mariana fruit bat in the wild because sufficient habitat and populations are likely to persist throughout its range at levels that retain the potential for recovery of this species. The current Proposed Action is anticipated to impact approximately 1,065 acres of Mariana fruit bat recovery habitat (Figure 3-1). This is a decrease of 459 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the *Serianthes* bracing and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Mariana fruit bat. These actions serve to minimize or compensate for project effects on the Mariana fruit bat (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated 1,524 acres of habitat suitable for the recovery of the Mariana fruit bat would be lost due to the Proposed Action (1,520 acres in the north and 4 acres in the south). In the 2010 BO, the USFWS concluded 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 Mariana fruit bat in the wild because sufficient habitat and populations are likely to persist throughout its range at levels that retain the potential for recovery of this species. The current Proposed Action is anticipated to impact approximately 1,065 acres of Mariana fruit bat recovery habitat (Figure 3-1). This is a decrease of 459 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

Figure 4-2. Small Arms A-Weighted day-night average sound level, Noise Zones for NWF



BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the *Serianthes* bracing and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Mariana fruit bat. These actions serve to minimize or compensate for project effects on the Mariana fruit bat.

Conclusion

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) few to no bats within the Proposed Action Area, (3) the slower pace of construction than the 2010 Proposed Action, (4) auditory or visual human disturbance not affecting the presence of the primary constituent elements used to define critical habitat (USFWS 2004a), and (5) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Mariana fruit bat, its critical habitat or recovery habitat.

The anticipated benefit of implementing the conservation measures mentioned above is improved habitat quality for the Mariana fruit bat. Although recovery habitat has been identified by the USFWS, the habitat is not currently suitable to support the recovery of the species as predation from the BTS is believed to one of the reasons for the lack of fruit bat recovery on Guam (USFWS 2009), BTS research and suppression should benefit the species and other native species on Guam. Forest enhancement would support the recovery of the species as habitat destruction by man-made disturbances is one of the primary threats to the species throughout its range.

Based on the potential direct and indirect effects on the Mariana fruit bat due to the proposed construction and operation of USMC facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Mariana fruit bat. This determination is consistent with the previous BO however, the rationale has changed. The previous conclusion was based on the USFWS anticipating that up to ten remaining Mariana fruit bats at the Pati Point natural area colony will be taken in the form of harassment due to loud aircraft noise resulting from the Proposed Action. The bat population on Guam continues to decline but the decline is not attributable to either the ISR Strike program or JGPO as both programs have been delayed in implementation. However, it is still possible for the Proposed Action to result in incidental take in the form of harassment for the small number of bats that remain on-island.

Table 4-1.Comparison of Recovery Habitat Impacts Between 2010 and 2014 Proposed Action

	Guam Micronesian Kingfisher		Guam Rail		Mariana Crow		Mariana fruit bat		Serianthes nelsonii	
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares
Current Recovery Habitat Remaining[1]										
Northern Guam	15,822	6,403	49,564	20,058	14,831	6,002	15,577	6,304	11,668	4,722
Southern Guam	13,488	5,458			11,819	4,783	13,731	5,557		
Total Necessary for Species Recovery[1]										
Northern Guam	13,134	5,315	41,184	16,668	7,463	3,020	Not Determined2		Not Determined	
Southern Guam	13,134	5,315			7,463	3,020				
Amount of Remaining Recovery Habitat Above Minimum Threshold Level Necessary for Species Recovery[1]										
Northern Guam	2,688	1,088	8,380	3,390	7,368	2,982	Not Determined[2]		Not Determined	
Southern Guam	354	143			4,356	1,763				
Recovery Habitat Within 2010 Project Description										
Northern Guam	1,520	615	1317	533	1,518	614	1,520	615	No Impacts	
Southern Guam	4	3			4	2	4	2		
Recovery Habitat Within 2014 Project Description										
Northern Guam	1,061	429	1071	433	1,068	432	1,061	429	933	378
Southern Guam	4	3			4	2	4	2	0	0
Decrease in Recovery Habitat Impacts between 2010 and 2014 Project Descriptions										
Northern Guam	459	186	246	100	450	182	459	186	Not Applicable	
Southern Guam	0	0			0	0	0	0		
Recovery Habitat Remaining after 2014 Project Description is Completed										
Northern Guam	14,761	5,974	48,493	19,625	13,763	5,570	Not Determined[2]		Not Determined	
Southern Guam	13,484	5,455	0	0	11,815	4,781				
Amount of Recovery Habitat Above Minimum Threshold for Species Recovery after 2014 Project Description is Completed										
Northern Guam	1,627	659	7,309	2,957	6,300	2,550	Not Determined[2]		Not Determined	
Southern Guam	350	140	7,309	2,957	4,352	1,761				

[1] Based on 2010 BO

[2] USFWS has insufficient data to estimate with confidence how much forest is necessary to support fruit bat recovery

4.3 POTENTIAL EFFECTS TO THE MARIANA CROW

Construction and Operations

The Mariana crow is considered extirpated from the wild on Guam (USFWS 2013b). The closest population of crows is on the island of Rota, approximately 56 miles (90 km) north of Guam. There are currently neither projected dates for reintroduction of the crow, nor successful suppression of the BTS to a level which would support reintroduction. Until the crow is successfully reintroduced and then has the potential to be exposed to construction and operational activities, impacts to the crow would be limited only to recovery prospects (addressed below).

Critical Habitat

The analysis of the potential effects to critical habitat for the Mariana crow are the same as stated in Section 4.2 for the Mariana fruit bat. As stated above, the 364 acres (147 ha) of remaining critical habitat would remain functional to serve the intended conservation role for the species based on the USFWS's December 9, 2004 interim guidance to USFWS biologists conducting Section 7 consultations and the

application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act (USFWS 2004b).

Recovery Habitat

The USFWS has identified approximately 26,650 ac (10,785 ha) of habitat on Guam as suitable for the recovery of the Mariana crow (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated a minimum of 14,926 acres (6,040 ha) were needed to recover the species on Guam and 1,522 acres of habitat suitable for the recovery of the Mariana crow would be lost due to the Proposed Action (1,518 acres in the north and 4 acres in the south). The 2010 BO stated the Proposed Action was not likely to appreciably reduce the likelihood of the survival and recovery of the Mariana crow in the wild. The current Proposed Action is anticipated to impact approximately 1,072 acres of Mariana crow recovery habitat (Figure 3-2). This is a decrease of 450 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Mariana crow. These actions serve to minimize or compensate for project effects on the Mariana crow.

Conclusion

The Mariana crow is currently extirpated from the wild on Guam, therefore no take will occur as a result of the Proposed Action. Based on the potential indirect effects to the Mariana crow from habitat loss due to the proposed construction of facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Mariana crow. This determination is consistent with the previous BO. Although the Proposed Action will result in a permanent loss of available habitat for the Mariana crow on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species. This determination is consistent with the previous BO.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, (3) auditory or visual human disturbance not affecting the presence of the primary constituent elements used to define critical habitat (USFWS 2004a), and (4) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Mariana crow critical habitat or recovery habitat.

The anticipated benefit of implementing the conservation measures mentioned above is improved habitat quality for the Mariana crow and the availability of resources critical for the survival and reproduction of the species. As predation from the BTS is believed to be the overriding factor in the decline of the Mariana crow on Guam (USFWS 2005b), BTS research and suppression should benefit the species and other native species on Guam. In addition, predation by cats is considered a primary threat to the crow throughout its range (USFWS 1984, USFWS 2005b) so cat control should also benefit this species. Forest enhancement would support the recovery of the species as habitat degradation due to grazing by feral

ungulates and range expansion of invasive plants are also factors in the decline of the Mariana crow (USFWS 2005b).

Although the Proposed Action will cause an immediate loss of recovery habitat, the crow is extirpated from the wild on Guam and the existing off island populations are not expected to encounter an impact from the Proposed Action as the BTS is still the primary factor limiting survival of the species on Guam. The opportunity for reintroduction of this extirpated species on Guam is uncertain at this time, and is primarily dependent on the eradication or significant suppression of the BTS population. Currently there are neither a plan or projected dates for reintroduction of the Mariana crow on Guam. Reintroduction is not anticipated in the foreseeable future, but USFWS does anticipate it sometime during the lifespan of the Proposed Action. Thus, this conservation measure has the benefit of time to succeed in its objective to enhance habitat to support the reintroduction and eventual recovery of the extirpated species and thus minimizes the impacts to the ability to recover the species. The loss of habitat does not impact the continued survival of the species as it doesn't currently survive in the wild on Guam.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

4.4 POTENTIAL EFFECTS TO THE GUAM MICRONESIAN KINGFISHER

Construction and Operations

The Guam Micronesian kingfisher was extirpated from the wild by 1988 (Wiles et al. 2003). The species exists primarily in captivity on Guam and in mainland zoos. There are currently neither projected dates for reintroduction of the kingfisher, nor successful suppression of the BTS to a level which would support reintroduction. Until the kingfisher is successfully reintroduced and then has the potential to be exposed to construction and operational activities, impacts to the kingfisher would be limited only to recovery prospects (addressed below).

Critical Habitat

The analysis of the potential effects to critical habitat for the Guam Micronesian kingfisher are the same as stated in Section 4.2 for the Mariana fruit bat. As stated above, the 364 acres (147 ha) of remaining critical habitat would remain functional to serve the intended conservation role for the species based on the USFWS's December 9, 2004 interim guidance to USFWS biologists conducting Section 7 consultations and the application of the “Destruction or Adverse Modification” Standard under Section 7(a)(2) of the Endangered Species Act (USFWS 2004b).

Recovery Habitat

The USFWS has identified approximately 29,310 ac (11,561 ha) of habitat on Guam suitable for the Guam Micronesian kingfisher (USFWS 2010a). To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated a minimum of 26,268 acres (10,630 ha) were needed to recover the species on Guam. The 2010 BO estimated 1,524 acres of habitat suitable for the recovery of the Guam Micronesian kingfisher would be lost due to the Proposed Action (1,520 acres in the north and 4 acres in the south). The current Proposed Action is anticipated to impact approximately 1,065 acres of Guam Micronesian kingfisher recovery habitat (Figure 3-3). This is a decrease of 459 acres from the amount anticipated in 2010, and thus is anticipated to have an associated reduction in potential impact to the species. In 2010, the USFWS concluded that the effects of the subject action, taken together with cumulative effects, were not likely to appreciably reduce the likelihood of both the survival and recovery of the Guam Micronesian kingfisher in the wild (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Guam Micronesian kingfisher. These actions serve to minimize or compensate for project effects on the Guam Micronesian kingfisher.

Conclusions

The Guam Micronesian kingfisher is currently extirpated from the wild, therefore no take will occur as a result of the Proposed Action. Based on the potential indirect effects on the Guam Micronesian kingfisher due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Guam Micronesian kingfisher. Although the Proposed Action will result in a permanent loss of available habitat for the Guam Micronesian kingfisher on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species. This determination is consistent with the previous BO.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, (3) auditory or visual human disturbance not affecting the presence of the primary constituent elements used to define critical habitat (USFWS 2004a), and (4) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Guam Micronesian kingfisher critical habitat or recovery habitat.

The anticipated benefit of implementing the conservation measures is improved habitat quality for the Guam Micronesian kingfisher. Currently, a high density of BTS is the primary factor preventing the kingfisher's survival and recovery on Guam. BTS research and suppression should benefit the species and other native species on Guam. Forest enhancement will also support the recovery of the species as habitat degradation from feral ungulate browsing and trampling is also a factor in the decline of the kingfisher (USFWS 2008a).

Although the Proposed Action will cause an immediate loss of recovery habitat, the kingfisher is extirpated from the wild on Guam and the existing captive populations would not immediately encounter an impact from the Proposed Action. The opportunity for reintroduction of this extirpated species on Guam is uncertain at this time, and is primarily dependent on the eradication or significant suppression of the BTS population. Although recovery habitat has been identified by the USFWS, the habitat is not currently suitable to support the recovery of the species as predation from the BTS is believed to one of the reasons for the lack of fruit bat recovery on Guam Currently there are neither a plan or projected dates for reintroduction of the Guam Micronesian kingfisher on Guam. Reintroduction is not anticipated in the

foreseeable future, but USFWS does anticipate it sometime during the lifespan of the Proposed Action. Thus, this conservation measure has the benefit of time to succeed in its objective to enhance habitat to support the reintroduction and eventual recovery of the extirpated species and thus minimizes the impacts to the ability to recover the species. The loss of habitat does not impact the continued survival of the species as it doesn't currently survive in the wild on Guam.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

4.5 POTENTIAL EFFECTS TO THE GUAM RAIL

Construction and Operations

The Guam rail was believed to have been extirpated from the wild on Guam by 1987 (Wiles et al. 1995) and exists primarily in captivity on Guam and in mainland zoos. There are currently neither projected dates for reintroduction of the rail on the main island of Guam, nor successful suppression of the BTS to a level which would support reintroduction. Until the rail is successfully reintroduced and then has the potential to be exposed to construction and operational activities, impacts to the rail would be limited to recovery prospects (addressed below).

Critical Habitat

There is no critical habitat designated for the Guam rail.

Recovery Habitat

The USFWS has identified approximately 49,564 ac (20,058 ha) of habitat on Guam as suitable for the Guam rail (USFWS 2010a). The 2010 BO estimated a minimum of 41,184 acres (16,668 ha) were needed to recover the species on Guam. In the 1990 recovery plan for the rail, the USFWS identified the interim recovery objectives for downlisting the Guam rail from endangered to threatened as 1,000 birds in northern Guam and 1,000 birds in southern Guam (total = 2,000 individuals; USFWS 1990b). There were no criteria for delisting the species. The 2010 BO referenced an article by Trail et al. (2009) entitled "Pragmatic population viability targets in a rapidly changing world" that suggested that a minimum viable population target of 5,000 individuals is an appropriate target for species conservation. The article was not specific to rails or birds or any species but rather an overall approach to population targets. The recovery habitat criteria for the rail was based on an internal memorandum for February 2010 (Amidon 2010 in USFWS 2010a) and used the 5,000 individuals in the estimation of recovery habitat needed to delist the Guam rail. To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The 2010 BO estimated 1,317 acres of habitat suitable for the recovery of the Guam rail would be lost due to the Proposed Action. The current Proposed Action is anticipated to impact approximately 1,071 acres of Guam rail recovery habitat (Figure 3-4). This is a decrease of 246 acres and thus is anticipated to have an associated reduction in potential impact to the species (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of Guam rail. These actions serve to minimize or compensate for project effects on the Guam rail.

Conclusion

Because the Guam rail is extirpated from the wild on Guam, no adverse effects to individual rails will occur as a result of the Project Description. Based on the potential indirect effects on the Guam rail due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **is likely to adversely affect** the Guam rail. Although the Proposed Action will result in a permanent loss of available habitat for Guam rails on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, and (3) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the Guam rail and its recovery habitat.

The anticipated benefit of implementing the conservation measures is improved habitat quality for the Guam rail. The primary reason for the decline in the Guam rail is believed to be from predation by cats and BTS. BTS research and suppression as well as cat control should benefit the species and other native species on Guam.

The anticipated benefit of implementing this conservation measure is improved habitat quality for the Guam rail and the availability of resources critical for the survival and reproduction of this species and other species that the habitat is able to support. Although the Proposed Action will cause an immediate loss of recovery habitat, the rail is currently extirpated from the wild on Guam and the existing captive or off island populations would not immediately encounter an impact from the Proposed Action. The opportunity for reintroduction of these extirpated species on island of Guam is uncertain at this time, and is primarily dependent on the eradication or significant suppression of the BTS population. Currently there is neither a plan nor projected dates for reintroduction of the Guam rail. USFWS does anticipate it sometime during the lifespan of the Proposed Action. Thus, this conservation measure has the benefit of time to succeed in its objective to enhance habitat to support the reintroduction and eventual recovery of the extirpated species and thus minimizes the impacts to the ability to recover the species. The loss of habitat does not impact the continued survival of the species as it doesn't currently survive in the wild on Guam.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

4.6 POTENTIAL EFFECTS TO THE MARIANA GRAY SWIFTLET

Construction and Operations

The potential effects to the Mariana gray swiftlet remain unchanged from the 2010 BO. The following are excerpts from the analysis from the 2010 BO.

The current estimate of the Mariana swiftlet population on Guam is 1,150 birds (Grimm 2008). On Guam, all three of the caves currently occupied by Mariana swiftlets are located within the NMS, and none of the proposed project stressors will occur near those caves.

However, new aviation training flight paths are proposed over the Talafofo River watershed, the primary foraging area for swiftlets on Guam, and over the NMS area (Figure 3-5). Flights may also occur over the Ugum River watershed that supports swiftlet foraging near the mouth of the river. Foraging by most members of the swift family is likely limited to 328 ft (100 m) above the tree canopy because of the reduction in insect prey above that level (Chantler 1999). Tree canopy height plus 328 ft (100 m) is expected to be well below 1,000 ft (305 m) above ground level, thereby reducing risk of bird/wildlife aircraft strike hazard but noise generated by the aircraft may still affect swiftlet foraging behavior, as has been documented in other species.

Critical Habitat

There is no critical habitat designated for the Mariana gray swiftlet.

Recovery Habitat

There is no recovery habitat identified for the Mariana gray swiftlet.

BMPs and Conservation Measures

To avoid bird strike and noise impacts to Mariana gray swiftlet, all aviation training will be conducted so that flights will approach the southern portion of the NMS over the Talafofo River watershed and Fena Reservoir at heights of 1,000 ft (305 m) or greater above ground level. Flights may go up the Ugum River at altitudes of 1,000 ft (305 m) or greater above ground level until they reach 9,843 ft (3,000 m) from the mouth of the river at Highway 4 and then flights may conduct low level terrain flights. Low-level training flights will be restricted to the southernmost portion of the NMS where swiftlets and moorhen are not commonly present.

Consistent with the MIRC BO, the DoD will maintain 328-ft (100-m) no training buffers around the known Mariana swiftlet nesting caves (e.g., Mahlac Cave, Fachi Cave, Maemong Cave) in the NMS and will continue to trap brown treesnake within areas surrounding the swiftlet caves.

Conclusion

Because the proposed project will avoid Mariana swiftlet cave habitat, and because the proposed approach of aircraft will be higher than foraging Mariana swiftlets, the Proposed Action **is not likely to adversely affect** the Mariana swiftlet.

4.6 POTENTIAL EFFECTS TO *SERIANTHES NELSONII*

Construction and Operations

The only known mature *Serianthes* tree on Guam is located on the northwest corner of the impacted area associated with the proposed MPMG Range. The tree at NWF is in poor condition due to termites and

rotting at the base. The tree is leaning which renders it more susceptible to snapping or toppling in the event of a catastrophic typhoon.

Current literature regarding the protection of trees from construction activities, recommend a protective buffer based on the diameter at breast height (dbh) of the subject tree (Oregon State University 2009; University of Hawaii 2010; Johnson 2013). This buffer is related to the "critical root radius" approach which is calculated by measuring the dbh in in. For each inch of dbh, there is to be 1.5 ft (0.5 m) of critical root radius for sensitive, older, or unhealthy trees, or 1 ft (0.3 m) for tolerant, younger, healthy trees to ensure protection of the root zone. Therefore, based on the current dbh of 22.4 in (57 cm) for the subject *Serianthes* at NWF, the buffer would be 33.6 ft. To avoid any impacts to this tree, a minimum buffer of 100 ft (30 m) would be established around the tree and no activities would be permitted within this buffer. Therefore, there would be no impacts to the *Serianthes* tree with implementation of the proposed construction activities associated with the Proposed Action.

Critical Habitat

There is no critical habitat designated for *Serianthes nelsonii.*

Recovery Habitat

The 2010 BO did not address effects *Serianthes nelsonii* as the DON determined "no effect" to the species as part of the 2010 Proposed Action. However, as part of the consultation, the USFWS provided the DON with digital files depicting recovery habitat for *Serianthes nelsonii.* The digital files indicate there are approximately 11,668 ac (4,722 ha) of habitat on Guam suitable for *Serianthes nelsonii*. To date, the recovery plan for the species has not been updated to reflect the criteria for determining habitat suitability for recovery of the species.

The current Proposed Action is anticipated to impact approximately 933 acres of *Serianthes nelsonii* recovery habitat (Figure 3-6) (Table 4-1).

BMPs and Conservation Measures

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, Mariana fruit bat recovery actions on Rota and sea turtle public outreach) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of *Serianthes nelsonii* on Guam. These actions serve to minimize or compensate for project effects on the *Serianthes nelsonii* on Guam.

The BMPs and Conservation Measures coupled with (1) reduced amount of vegetation disturbance from the 2010 Proposed Action, (2) the slower pace of construction than the 2010 Proposed Action, and (3) development and implementation of the range management plan (Section 2.2.4) will avoid or minimize the effects of construction and operations on the *Serianthes nelsonii* recovery habitat.

The DON conservation measures are intended to support reintroduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DON intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DON and USFWS mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful reintroduction of the affected species is more probable than not, the DON will work with the USFWS to develop a reintroduction plan and supporting programmatic BO that ensures such reintroduction efforts are consistent with the species recovery plans and the military mission on Guam.

Conclusion

Based on the potential direct and indirect effects on *Serianthes nelsonii* due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **may affect but is not likely to adversely affect** *Serianthes nelsonii*. Although the Proposed Action will result in a permanent loss of available habitat for *Serianthes nelsonii* on Guam, there will still remain an adequate amount of habitat to provide for recovery of the species.

4.7 POTENTIAL EFFECTS TO SEA TURTLES

Construction and Operations

The proposed project construction, operation, and maintenance of facilities on Guam will have no direct impact on sea turtle basking and nesting habitat. However, recreational beach use is expected to increase on Guam due to the increase in military and civilian populations.

The green and hawksbill sea turtles potentially nest along the Haputo ERA beach and Tarague Beach. Two suspected nest attempts by green sea turtles have been observed at Haputo Beach between 2008 and 2010, with no observations of nest attempts during 51 surveys from 2010 to 2012 (Grimm and Farley 2008; NAVFAC Marianas 2011; Brindock 2012). All main cantonment components would be constructed on the upper plateau area of Finegayan and would not occur in the Haputo ERA. Construction personnel are issued base passes for official business only within proposed construction areas; these restrictions are specified in construction contracts. Use of Haputo and Tarague Beach is not expected to increase as a result of construction activities; therefore, there would be no impacts from construction personnel to sea turtles that may occur on the Haputo or Tarague Beach.

Green sea turtle nesting is documented on the GNWR north of the proposed LFTRC impacted areas. The hawksbill sea turtle has not been definitively determined to nest on Guam (JRM 2013). There are no sea turtle nesting beaches within proposed impacted areas associated with LFTRC. No explosive projectiles are proposed for use and all projectiles are expected to be contained within the range footprint by bullet traps or backstops, with the exception of ricochets. The DoD standard for risk acceptance on ranges is a 99.9999% level of containment, which means the probability of munitions (for inert ordnance) or a hazardous fragment (for live ordnance) escaping the SDZ is one in a million. Signage as well as lighting (blinking red lights) would notify people in the area that the ranges are in use. However, the design of the signage and lighting would be designed to insure minimal to negligible impacts on sea turtles.

Noise levels from ground training operations are within Noise Zones 2 and 3 and are confined within NWF. These noise events are dominated by the demolition charges which are impulsive sounds and generate C-weighted day-night levels of less than 62 C-weighted decibels at the boundary of NWF. The noise modeling results are shown on Figure 4-2. The Zone 2 noise contours cover approximately 48 onshore acres (19 ha) beyond the boundaries of DoD land at NWF or DOI land onto private property near the entrance to the Wildlife Refuge and Jinapsan Beach.

Potential impacts could occur during temporary construction activities (e.g., noise, lighting, and general human disturbance) and operations associated with the proposed ranges at NWF. In order to address this question, DON requested a Special Use Permit from the GNWR to conduct an experiment to measure and characterize small-caliber noise levels from live-fire and simulated fire testing on the NWF portion of AAFB. The data gathered was intended to support the analysis of potential environmental impacts resulting from the proposed construction and operation of the LFTRC at NWF. However, the GNWR denied the request citing the DON's proposed use as presented in the "Test Plan: NWF Noise Study" appeared inconsistent with law, regulations, and policies for administering the National Wildlife Refuge

System and inconsistent with the wildlife conversation purposes of GNWR. DON proceeded with the noise study on AAFB and between April 15-22, 2104, DON recorded ambient noise on NWF at AAFB at three recording locations. Two sites were at the edge of the cliff overlooking GNWR. One site was 200 m back from the cliff edge. Professional-grade Larsen Davis model 831 sound level meters were used to make the sound measurements. During the sampling period there was a persistent noise floor at the three sites that was above 65 dB a large percentage of the time. Of the three sampling sites, the location within the mature limestone forest had the highest ambient noise levels. At this location, the overall unweighted noise level was virtually never below 50 dB and above 65 dB almost 100% of the time on some days (NAVFAC PAC 2014).

The majority of scientific information about sea turtle hearing has assessed their hearing in the water. Hearing underwater is the most important environment for turtles to be assessed in because the vast majority of sea turtles' time is spent in the water, with the females spending only a few hours on land each year for nesting. Green sea turtles are an exception, because they spend some time basking on beaches (Whittow and Balazs 1982). The general properties of turtle hearing are expected to be similar in the water and on land, but turtles are expected to be less sensitive to sound on land than in the water, because turtles have evolved to hear primarily in the water.

The opening into a sea turtle's ear is covered by thick skin, known as the cutaneous plate, which is a ring of scales that are similar but smaller than those on the rest of the head. Below this skin is a fatty (subcutaneous) layer. The thick skin and a fatty layer make it difficult for the turtle to hear well in air, but provide good tissue conduction for underwater sound to the middle ear and inner ear. Sea turtles do not have external ears or ear canals to channel sound to the middle ear, nor do they have a specialized eardrum. Instead, fibrous and fatty tissue layers on the side of the head may serve as the sound receiving membrane in the sea turtle (Ketten 2008), a function similar to that of the eardrum in mammals, or may serve to release energy received via bone conduction (Lenhardt, Bellmund et al. 1983). Unlike mammals, the cochlea of the sea turtle is not elongated and coiled and likely does not respond well to high frequencies, a hypothesis supported by information on sea turtle auditory sensitivity (Ridgway, Wever et al. 1969, Bartol, Musick et al. 1999, Dow Piniak, Eckert et al. 2011, Dow Piniak, Harms et al. 2012, Martin, Alessi et al. 2012).

The auditory system of the sea turtle appears to work via water and bone conduction, with lower frequency sound conducted through to skull and shell, or via direct stimulation of the structures of the middle ear (Christensen-Dalsgaard, Brandt et al. 2012). The water and bone conduction does not appear to function well for hearing in air (Lenhardt, Bellmund et al. 1983). Recent research has shown that sea turtles are capable of hearing in air, and although it is difficult to compare aerial and underwater thresholds directly, frequencies of sensitivity are similar for several species tested (Dow Piniak, Eckert et al. 2011, Dow Piniak, Harms et al. 2012). Because of the similarity of physiology, ecology, and empirical data on hearing, the frequency range of sea turtle species are presumed to be similar.

Investigations suggest that sea turtle auditory sensitivity is limited to frequencies below 1,000 Hertz [Hz]), such as the sounds of waves breaking on a beach. Sea turtles typically hear frequencies from 30 to 2,000 Hz, with a range of maximum sensitivity between 100 and 800 Hz (Ridgway, Wever et al. 1969, Lenhardt 1994, Bartol, Musick et al. 1999, Lenhardt 2002, Bartol and Ketten 2006). Hearing below 80 Hz is less sensitive but still potentially usable (Lenhardt 1994). The role of underwater low-frequency hearing in sea turtles is unclear. It has been suggested that sea turtles may use acoustic signals from their environment as navigational cues during migration and to identify their natal beaches (Lenhardt, Bellmund et al. 1983) or to locate prey or avoid predators. Recent work using auditory evoked potentials

have shown that hawksbill sea turtles are able to detect sounds in both air and water. However, ranges of maximum sensitivity and thresholds differed between the two media, though in general, sensitivities were higher at frequencies below 1,000 Hz (Dow Piniak, Eckert et al. 2011, Dow Piniak, Harms et al. 2012).

Juvenile and sub-adult green sea turtles detect sounds from 100 to 500 Hz underwater, with maximum sensitivity at 200 and 400 Hz (Bartol and Ketten 2006). Auditory brainstem response recordings on green sea turtles of 2, 5, and 9 years of age all showed an average peak response at 300 Hz (Yudhana, Din et al. 2010). In another study, sub-adult green turtles also show, on average, the lowest hearing threshold at 300 Hz (93 decibels [dB] referenced to [re] 1 micropascal [μPa]), with thresholds increasing at frequencies above and below 300 Hz, when thresholds were determined by auditory brainstem response (Bartol and Ketten 2006). Adult green turtles have greatest sensitivity to frequencies between 300 and 400 Hz (Ridgway, Wever et al. 1969).

For green turtles that come ashore in northern Guam, the greatest amount of ambient noise energy occurs in frequencies to which the green turtle is most sensitive. Unweighted ambient noise recorded from the edge of the cliff above the Guam National Wildlife Refuge showed the greatest persistent sound levels occurred below 500 Hz (NAVFAC Pacific 2014). Sound levels that were integrated across five-minute intervals measured sound pressure levels (SPLs) that often exceeded moderate noise levels such as 60 to 65 dB. Peak sound levels could exceed 75 dB in the octave band centered at 125 Hz on a regular basis. Much of this low frequency noise is attributed to waves. Sound levels at the top of the cliff several hundred feet above and back from the shoreline would be expected to be lower than sound of waves at the beach. Turtles on the beach would be certain to receive low frequency SPLs significantly greater than that recorded at the top of the cliff and the noise would be in the most sensitive part of their hearing range. In that environment, most other sounds in those frequency ranges could be expected to be masked by the proximate noise from the surf, which would make perceiving sounds in the same frequency range challenging (Lohr, Wright et al. 2003, Amézquita, Hödl et al. 2006).

In addition to aviation training, ground-based training occurs for force protection using pyrotechnics, ground burst simulators, smoke grenades, and 40-pound cratering charges. Noise levels from these operations are within Noise Zones 2 and 3 and are confined within NWF. These noise events are dominated by the demolition charges which are impulsive sounds and generate C-weighted day-night levels of less than 62 C-weighted decibels at the boundary of NWF. The noise modeling results are shown on Figure 4-2. The Zone 2 noise contours cover approximately 48 onshore acres (19 ha) beyond the boundaries of DoD land at NWF or DOI land onto private property near the entrance to the Wildlife Refuge and Jinapsan Beach.

Additional potential impacts to Mariana fruit bat critical habitat could occur during temporary construction activities (e.g., noise, lighting, and general human disturbance) and operations associated with the proposed ranges at NWF that would be adjacent to critical habitat. DON requested a Special Use Permit from the GNWR to conduct an experiment to measure and characterize small-caliber noise levels from live-fire and simulated fire testing on the NWF portion of AAFB. The data gathered was intended to support the analysis of potential environmental impacts resulting from the proposed construction and operation of the LFTRC at NWF. However, the GNWR denied the request citing the DON's proposed use as presented in the "Test Plan: NWF Noise Study" appeared inconsistent with law, regulations, and policies for administering the National Wildlife Refuge System and inconsistent with the wildlife conversation purposes of GNWR. DON proceeded with the noise study on AAFB and between April 15-22, 2104, DON recorded ambient noise on NWF at AAFB at three recording locations. Two sites were at the edge of the cliff overlooking GNWR. One site was 200 m back from the cliff edge. Professional-grade

Larsen Davis model 831 sound level meters were used to make the sound measurements. During the sampling period there was a persistent noise floor at the three sites that was above 65 dB a large percentage of the time. Of the three sampling sites, the location within the mature limestone forest had the highest ambient noise levels. At this location, the overall unweighted noise level was virtually never below 50 dB and above 65 dB almost 100% of the time on some days (NAVFAC PAC 2014).

Critical Habitat

There is no terrestrial critical habitat designated for the green or hawksbill sea turtle.

Recovery Habitat

The 2010 BO did not include recovery habitat for the green or hawksbill sea turtle and we are not aware of any subsequent recovery habitat criteria being developed.

BMPs and Conservation Measures

The Chief of Naval Operations issued a policy letter in 2002 regarding preventing feral cat and dog populations on Navy property. Enforcement of the policy and associated BMP regarding free-roaming pets would prevent potential impacts to nesting sea turtles from harassment, injury or mortality from pets.

All of the BMPs and Conservation Measures listed in Sections 2.3 and 2.4 (with the exception of the pre-construction surveys for bats, *Serianthes* bracing and Mariana fruit bat recovery actions on Rota) are intended to reduce the environmental impacts of Proposed Action and/or benefit or promote the recovery of the sea turtles on Guam. In addition, night operations at the LFTRC will depend on the number of personnel required to complete annual individual training events, the duration of each event, and the training capacity of each range. Proposed night time live-fire operations at the LFTRC are not continuous and would occur between 7:00 p.m. and 10:00 or 6:00 a.m. and 7:00 a.m up to 39 weeks per year. These actions will minimize or compensate for project effects on the green and hawksbill sea turtles on Guam.

Conclusion

Based on the potential direct and indirect effects on the sea turtles due to the proposed construction and operation of facilities on Guam, implementation of the Proposed Action **may affect but is not likely to adversely affect** the two species of sea turtles.

Potential impacts to sea turtles were evaluated for a similar, but larger Proposed Action in the 2010 Final EIS (Volume 2, Chapter 10: Terrestrial Biological Resources, Section 10.2.2.1: North, NCTS and South Finegayan; page 10-118), and 2010 BO. The effects determination in the 2010 BO was "may affect but not likely to adversely affect the species." The current effects determination is the same as the reduced size of the Proposed Action would continue to not likely adversely affect the species.

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CHAPTER 5
CUMULATIVE EFFECTS ANALYSIS

"Cumulative effects" under the ESA are those effects of *future* State or private activities, *not* involving federal activities, that are reasonably certain to occur within the Action Area of the federal action subject to consultation [50 CFR 402.02].

The future state or private activities that are reasonably certain to occur in the Action Area include the following:

- Commercial and recreational fishing
- Tourism
- Commercial shipping
- Private development
- Natural resources management
- Regional Biosecurity Plan

Implementing the Proposed Action in conjunction with other past, current, and future activities could affect terrestrial biological resources within the Action Area. Several ongoing or successional activities can contribute cumulatively to habitat degradation, including disturbance to soils and vegetation, control of non-native invasive species and/or spread of invasive non-native species, an increase in erosion and sedimentation, and impacts on native plant and animal species. Additionally, the development of Guam over the next few years on non-DoD lands may increase pressure on terrestrial habitats within DoD lands and development on DoD lands may increase pressure on terrestrial habitats on non-DoD lands. Although individual effects may be less than significant, collectively they have the potential to be cumulatively significant over time.

Fifteen reasonably foreseeable projects have the potential to contribute to an adverse cumulative effect to terrestrial biological resources on Guam (Table 5-1). This would be primarily due to the potential loss of native habitat and the increased potential for the spread of invasive species. Examples of projects with potential adverse impacts include Sigua Highlands (C-47), Route 4 Curve Widening (S-28), and 60 MW power Plant (G-6).

All new development requiring vegetation clearing has potential to impact terrestrial biological resources. There are federally and locally established habitat conservation areas, and increases in human population or other noise generating activities near these areas can disturb the populations of species that are to be protected in the conservation areas. There would be cumulative effects associated with the collective action alternatives in conjunction with recently completed, present, and reasonably foreseeable actions. The additive impact would be strong because the impacts could be long-term and difficult to reverse. Many of these projects, developments, and actions, and their impacts on terrestrial biological resources cannot be determined with specificity at this time. Most of the projects require ground disturbance, and the assumption is that terrestrial biological resources would be affected. The terrestrial biological resource health on Guam would continue to decline, and threatened and endangered species would continue to be vulnerable to natural and anthropogenic stressors. Because the development area of the collective action alternatives is presumably larger than that of the recently completed, present, and reasonably foreseeable actions, the additive cumulative impacts are primarily due to the direct impacts of the collective action alternatives.

GovGuam reviews private and commercial development proposals for potential impacts to terrestrial biological resources. USFWS and GovGuam review DoD and other federal development proposals and

mitigation is developed through the consultation process There are local and federal initiatives and protocols to prevent the introduction of non-native species. There are local and federal conservation and restoration efforts. No additional mitigation is proposed for cumulative impacts to terrestrial biological resources.

A complete discussion of the cumulative impacts of other federal projects within the Action Area can be found in Chapter 7 of the Final SEIS.

Table 5-1. Summary of Potential Long-Term Impacts of Present and Reasonably Foreseeable Future Projects on Resource Area

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
Guam - General Actions (G) (not mapped)																					
G-6	GovGuam	60 MW Power Plant	RF		X	X			X		X		X	X			B	B	X	B	B
G-7	Rubio & David	Health Clinic	P		X						X		X	X	X			B		B	B
G-8	Carlos & Rosemarie Takano	Multi-Family Dwelling	P		X					X	X		X	X				B			B
G-9	GovGuam	Pole Hardening	P																	B	B
G-10	GovGuam	Territorial Prison	RF		X				X		X		X	X				B		B	B
G-11	GovGuam	Lateral Conversion Of Power Lines To Underground Lines	P						B		X		X	B			B			B	B
G-12	GovGuam	Wastewater System Planning	P		B							B					B				B
G-13	GovGuam	Facilities Plan / Design for WWTP	P		B							B					B			B	B
G-15	GovGuam	Water Booster Pump Station	P		B						X		X				B			B	B
G-18	GovGuam	Water Wells	P		B						X		X				B			B	B
G-19	GovGuam	Wastewater Collection System Replacement/Rehabilitation Program	P		B						X	B	X				B			B	B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
G-20	GovGuam	LS Priority 1 Upgrades	P		B							B					B			B	B
G-21	GovGuam	WWTP Priority 1 Upgrades	P		B							B					B			B	B
G-22	GovGuam	Water Distribution Pipe Replacement	P		B							B					B			B	B
N-29	Sung Kim	Small Commercial Development	P		X						X		X	X	X			B			
N-32	GovGuam	Northern District Wastewater Treatment Plant Phases 1-3	P		B						X	B	X				B			B	B
N-35	Golden Gate Services LLC	Single Family Homes	P		X					X	X		X	X	X			B			B
N-36	TRI Inc.	Paradise Meadows	P	X	X					X	X		X	X	X			B			B
N-37	GDPW	Jinapsan Road	P	X	X				B	B	X	X			B			B			
N-38	Guam Healthcare	Guam Regional Medical City	P	X	X				X		X		X	X	X			B		B	B
N-41	Vantage Group	Villa Pacita Estates	P	X	X					X	X		X	X	X			B			B
N-42	GovGuam	Relocation of Dededo Flea Market and Construction of Farmer's Co-op	P	X							X		X	X	X			B			
N-43	Hawaiian Rock Products	Infrastructure Construction	P								X		X		B					B	B

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				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
C-21	Access Development Company	Emerald Ocean View Park	P	X	X					X	X	X	X	X	X	X	X	B			B
C-22	GovGuam	Guam Memorial Hospital Emergency Room Expansion	P								X		X					B		B	B
C-23	GovGuam	Ordot Dump Closure Construction and Dero Road Sewer Improvements	P		B				B								B	B		B	
C-24	GovGuam	Guam Museum	P						B	B	X		B	X				B			
C-25	Laguna at Pago Bay Resort	Upscale Residential Development	P	X	X					X	X		X	X	X			B			B
C-27	Orion Construction	Island Surgical Center	P		X				X		X		X	X	X			B		B	B
C-28	GHURA	Summer Green Residences	P	X	X					X	X		X	X	X			B			B
C-29	GovGuam	Route 1-8 Intersection Improvements & Agana Bridges Replacement	P	B	B						X		X		B					B	B
C-30	GovGuam	Rehabilitation of Asan Springs	P		B						X		X				B			B	B
C-31	GovGuam	Route 26/25 Intersection Improvements	RF	B	B						X		X		B					B	B

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C-32	UoG	Wind Turbine	P			B		X	X		X		X	X			B			B	B
C-34	Access Development Company	Hemlani Apartments	P	X	X					X	X		X	X	X			B			B
C-35	GovGuam	Guam Airport Project	RF		X		X	X			X		X					B		X	B
C-36	GovGuam	Route 26 Reconstruction & Widening, Route 1 to Route 25	RF	B	B						X		X		B					B	B
C-37	GovGuam	Route 10A, Rehabilitation & Widening, Sunset Blvd. to Route 16	RF	B	B						X		X		B					B	B
C-38	GovGuam	Runway Rehabilitation and Expansion	P			X		X			X		X							B	B
C-39	GovGuam	Gregorio D. Perez Marina Renovation & Site Improvement Project	P							B		X	X	X		B					B
C-40	GovGuam	Gregorio D. Perez Marina Dock C Repairs	P							B		X	X			B					B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

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C-41	GovGuam	Facilities Plan for Hagåtña STP Improvements & Effluent Wastewater Pump Station	P		B							B					B			B	B
C-42	GovGuam	Hagåtña STP Improvements and Effluent Wastewater Pump Station	P		B						X	B	X				B			B	B
C-43	GovGuam	Agana STP Interim Measures	P		B						X	B	X				B			B	B
C-45	GUANG	Assembly Hall	P								X		X								B
C-46	GovGuam	Route 8/Canada Toto Loop Road Intersection Improvements	P	B	B						X		X		B					B	B
C-47	Guam Highlands Investment Group	Sigua Highlands / near Leopalace	RF	X	X					X	X		X	X	X		X	B			B
C-48	GovGuam	Tiyan Parkway, Phase 1	P	B	B						X		X		B					B	B
C-49	GovGuam	Route 14B (Ypao Road) Reconstruction & Widening, Route 1 to Route 14	P	B	B						X		X		B					B	B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
C-50	GovGuam	Route 10A, Route 1 GIA/Tiyan Intersection	RF	B	B						X		X		B					B	B
C-53	GovGuam	Repair Finegayan Road-Harmon Cutoff	RF	B	B						X		X		B					B	B
Guam - Central Apra Harbor (AH)																					
AH-1	CNM	Orote Magazines (P-425)	P		X						X		X						X	B	X
AH-2	GovGuam	Reforestation of Masso Reservoir	P	B	B	B					B	B	X	B							B
AH-8	GovGuam	Route 11 Improvements and Shore Protection	P	B	B						X	B	X		B					B	B
AH-9	GovGuam	Asan and Aguada Bridge Rehabilitation	RF		B										B					B	B
AH-10	CNM	X-Ray Wharf Improvements (P-518)	RF								X	X				B			X	X	
AH-11	GovGuam	Modernization Program: Port Reconfiguration, Maintenance and Repair	P			X					X	X	X		X	B		B	B	B	B
AH-12	GovGuam	Comprehensive Port-wide Closed Caption Television System	P								X		X				B				
AH-13	GovGuam	Marine & Port Security Operations Center	P		X						X	X	X			B				B	B

Legend: P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

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				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
AH-14	GovGuam	Emergency Backup Generators	P			X											B			B	B
Guam – South (S)																					
S-4	GovGuam	15 MW Solar / Wind Turbine	P			B		X	X		X		X	X			B			B	B
S-5	GovGuam	Santa Rita Springs Booster Pump	P		B							B					B			B	B
S-7	GovGuam	Brigade II (Ugum Lift) Booster Pump Station Upgrade	P		B							B					B			B	B
S-8	GovGuam	Ugum Water Treatment Plant Intake Modifications	P		B							B					B			B	B
S-9	GovGuam	Ugum Water Treatment Plant Reservoir Replacement	P		B						X	B	X				B			B	B
S-10	GovGuam	Old Agat Wastewater Collection (Phase II)	P		B							B					B			B	B
S-12	GovGuam	Old Agat Collection Continuation (Phase III)	P		B							B					B			B	B
S-14	GovGuam	Baza Gardens STP Replacement	P		B							B					B			B	B

Legend: RC = recently completed; P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

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S-15	GovGuam	Agat / Santa Rita STP Replacement	P		B							B					B			B	B
S-16	GovGuam	Agat Marina Dock A Repair & Renovation	P		B					B		X				B			X		B
S-18	GovGuam	Umatac-Merizo STP Replacement	RF		B							B					B			B	B
S-19	GovGuam	Agfayan Bridge Replacement	P	B	B						X		X		B					B	B
S-20	GovGuam	Route 4, Togcha River to Ipan Beach Park	P	B	B						X		X		B					B	B
S-21	GovGuam	Route 17, Route 5 to Chalan Tun Ramon Baza, Phase 2A	P	B	B						X		X		B					B	B
S-22	GovGuam	Inarajan North Leg (As-Misa) Bridge Rehabilitation	P	B	B						X		X		B					B	B
S-23	GovGuam	Bile & Pigua Bridges Replacement	P	B	B						X		X		B					B	B

Legend: RC = recently completed; P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

ID #	Lead Agency or Proponent	Project Name	Recently Completed (RC), Present (P), or Reasonably Foreseeable (RF)	Potential Long-Term Impacts to Resources																	
				Geological and Soil Resources	Water Resources	Air Quality	Noise	Airspace	Land Use	Recreational Resources	Terrestrial Biological Resources	Marine Biological Resources	Cultural Resources	Visual Resources	Ground Transportation	Marine Transportation	Utilities	Socioeconomic and General Services	Hazardous Materials and Waste	Public Health & Safety	Environmental Justice
S-27	GovGuam	Route 17 Rehabilitation & Widening, Route 5 to Route 4A, Phase 2B	RF	B	B						X		X		B					B	B
S-28	GovGuam	Route 4 Curve Widening, Ylig Bridge to Dandan Road	RF	B	B						X		X		B					B	B
S-29	GovGuam	Route 5 Rehabilitation & Widening, Route 2A to Route 12	RF	B	B						X		X		B					B	B
S-31	GovGuam	Route 4, Ylig Bridge to Pago Bay	P	B	B						X		X		B					B	B
Number of recently completed projects potentially contributing to cumulative effects (X/B)			76	11/10	33/19	3/1	3/0	2/0	3/2	7/2	58/1	7/9	61/0	10/1	9/20	2/3	0/15	0/17	9/3	3/36	3/43
Number of present projects potentially contributing to cumulative effects (X/B)			95	9/16	56/40	5/3	4/0	8/0	4/4	11/5	67/1	7/23	67/1	17/2	15	5/6	0/29	0/19	5/6	5/52	3/63
Number of reasonably foreseeable projects potentially contributing to cumulative effects (X/B)			18	2/8	5/10	1/0	1/0	1/0	2/0	1/0	15/0	1/1	14/0	3/0	1/11	0/1	1/2	0/4	2/0	2/14	0/15
Total number of projects contributing to cumulative effects (X/B)			188	22/34	94/69	9/4	8/0	11/0	9/6	19/7	140/2	15/33	142/1	30/3	25	7/10	1/46	0/40	16/9	10/102	6/121

Legend: RC = recently completed; P = present; RF = reasonably foreseeable; STP = Sewage Treatment Plant; X = adverse; B = beneficial.

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CHAPTER 6
CONCLUSION

The Proposed Action is likely to adversely affect the Mariana fruit bat, Mariana crow, Guam rail, and Guam Micronesian kingfisher on Guam although this loss will not preclude the recovery or survival of these species. The DON has proposed several conservation measures to benefit these species and BMPs to proactively reduce, minimize, or avoid impacts (Table 2-1 and Table 2-2).

The BMPs will be implemented as appropriate for the individual construction projects. For example, HACCP plans will be required for all projects involving the shipment of materials, supplies or equipment to Guam however, only projects adjacent to recovery habitat will require monitoring to evaluate effectiveness of HACCP.

Implementation of the Conservation Measures will be based on the implementation of the action that results in an impact to recovery habitat. Table 6-1 identifies the elements of the Proposed Action that will result in impacts to recovery habitat. Appendix A is an expanded version of the table that details the various projects covered under the larger Project Description categories. The impacts to recovery habitat are calculated for the species with recovery habitat information. The recovery habitat for one species may overlap with another species. The DON is conducting forest enhancement on up to 1,072 acres of recovery habitat. As mentioned in Chapter 2, the Proposed Action involves horizontal construction work (U&SI). Once the U&SI site work or a development project (Appendix A) is initiated, a commensurate amount of forest enhancement would begin. If the associated vertical construction was never constructed, the forest enhancement would still be conducted as the impact to the resource resulted from the U&SI project.

Conservation Measures such as the Regional Biosecurity Plan, Brown Treesnake research and suppression, Brown Treesnake interdiction at the commercial ports have already been initiated as part of the 2010 BO and will continue until completed as specified in Section 2.4. The DON has developed the material for the sea turtle outreach and will distribute the activity booklets, posters and tri-fold brochures when the USMC population arrives on Guam. The bracing of the Serianthes would be initiated during the construction of the NWF LFTRC.

Table 6-1. Proposed Action and Associated Impacts to Recovery Habitat

FEIS 2010 ROD Related Actions and DSEIS 2014 Project Areas Project Name	Serianthes nelsonii Recovery Habitat (Ac)	Mariana Crow Recovery Habitat (Ac)	Guam Rail Recovery Habitat (Ac)	Mariana Fruit Bat & Guam Micronesian Kingsfisher Recovery Habitat (Ac)
FEIS 2010 ROD Related Actions	48.40	75.61	382.93	71.84
Cantonment U&SI Phase I	334.52	336.95	192.73	336.95
Cantonment U&SI Phase II	106.84	106.80	66.34	106.80
Family Housing at AAFB	10.84	10.84	39.73	8.18
Information Technology/Communications	18.51	23.66	96.86	23.46
Electrical, Wastewater, and Water Off Site Utilities	18.79	29.94	67.65	28.35
Water Well Development Area	90.00	90.00	90.00	90.00
Live Fire Training Range Complex - MPMG	62.63	80.50	27.05	80.50
Live Fire Training Range Complex - KD Ranges	115.99	134.78	45.96	134.04
Live Fire Training Range Complex - USFWS Relocation	2.88	13.04	0.00	14.42
AAFB - Expand Middle School	0.00	0.00	0.00	0.00
Guam High School Expansion	0.00	0.00	2.08	0.00
MC&FH Finegayan Blue Box Area Outside U&SI Projects	138.31	197.32	144.42	197.32
Related Actions and DSEIS 2014 Project Footprints	**933**	**1072**	**1071**	**1065**

Data Sources: SEIS Blue Box Boundaries Version 5; SEIS Green Boxes Version 1; MC&FH Finegayan CDP (12/19/2013); LFTRC Northwest Field CDP (11/27/13); Andersen South Training Site Plan 4(/2014); Guam Rainbow Chart 3/17/2014

Water Well Development Area - Water Well and Water Lines/Access Roads are Notional, up to 90 ac of impact

The DON has made the determination that the Proposed Action is likely to adversely affect the Mariana fruit bat and its associated recovery habitat. The Proposed Action is also likely to adversely affect the recovery habitat for the Mariana crow, Guam rail and Guam Micronesian kingfisher. A "may affect, not likely to adversely affect determination has been made for the Mariana gray swiftlet, Green sea turtle, Hawksbill sea turtle, and *Serianthes nelsonii* (Table 6-2).

Table 6-2. Threatened and Endangered Species Addressed in this Biological Assessment and Their Affects Determinations

Common Name	Scientific Name	ESA Status	Affects Determination	Critical Habitat
Mariana fruit bat	Pteropus mariannus mariannus	Threatened	Likely to Adversely Affect	Would remain functional to serve the intended conservation role for the species
Mariana crow	Corvus kubaryi	Endangered	Likely to Adversely Affect (habitat only)	Would remain functional to serve the intended conservation role for the species
Guam rail	Gallirallus owstoni	Endangered	Likely to Adversely Affect (habitat only)	Not applicable
Guam Micronesian kingfisher	Todiramphus [=Halcyon] cinnamominus cinnamominus	Endangered	Likely to Adversely Affect (habitat only)	Would remain functional to serve the intended conservation role for the species
Green sea turtle	Chelonia mydas	Threatened	May Affect, Not Likely to Adversely Affect	Not applicable
Hawksbill sea turtle	Eretmochelys imbricata	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Hayun lagu	Serianthes nelsonii	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable
Mariana gray swiftlet	Aerodramus vanikorensis bartschi	Endangered	May Affect, Not Likely to Adversely Affect	Not applicable

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CHAPTER 7
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APPENDIX A

Expanded Version of the Proposed Action and Associated Impacts to Recovery Habitat

FEIS 2010 ROD Related Actions and DSEIS 2014 Project Areas		Serianthes nelsonii Recovery Habitat (Ac)	Mariana Crow Recovery Habitat (Ac)	Guam Rail Recovery Habitat (Ac)	Mariana Fruit Bat & Guam Micronesian Kingsfisher Recovery
Project Name	Overlap - Project Name				
FEIS 2010 ROD Related Actions		48.40	75.61	382.93	71.84
	DSEIS 2014 Project Areas	6.96	9.66	50.42	9.26
Cantonment U&SI Phase I		334.52	336.95	192.73	336.95
	3rd MEB CE/MEB Enablers	4.85	4.85	1.59	4.85
	4th Marined Reg Fac	6.27	6.27	1.62	6.27
	4th Marines Reg HQ/CLB-4 HQ/Dental Co Admin	0.35	0.35	13.21	0.35
	9th ESB EOD/Base EOD/CLB4 Facilities	35.54	35.54	3.29	35.54
	9th ESB HQ	2.51	2.51	0.00	2.51
	9th ESB (-)	3.57	3.57	0.00	3.57
	Auditorium/Theater	1.46	1.46	0.54	1.46
	BASE - Bank & Credit Union	1.48	1.48	0.00	1.48
	BASE - MWD Kennel	1.95	1.95	0.00	1.95
	Base Admin & Comm	6.04	6.04	0.70	6.04
	Base Auto Shop	0.00	0.00	0.00	0.00
	Pub Wrks/Maint Shops	0.00	0.00	0.00	0.00
	Battle Sim Center	0.00	0.00	4.97	0.00
	BEQs (1 Building)	2.68	2.68	0.58	2.68
	BEQs (1 Building)	4.12	4.12	0.00	4.12
	BEQs (1 Building)	2.95	2.95	0.00	2.95
	BEQs (1 Building)	3.02	3.02	0.55	3.02
	BEQs (2 Buildings)	3.18	3.18	2.89	3.18
	BEQs (2 Buildings)	8.47	8.47	0.00	8.47
	BOQ (1 Building)	3.57	3.57	1.49	3.57
	BOQ (1 Building)	1.59	1.59	2.47	1.59
	BOQ (1 Building)	2.54	2.54	0.01	2.54
	BOQ (1 Building)	2.10	2.10	0.04	2.10
	BSTF	0.00	0.00	5.71	0.00
	Central Fueling Station	2.75	2.75	0.03	2.75
	Consolidated Armory	0.08	0.08	1.80	0.08
	Consolidated Club	1.01	1.01	0.49	1.01
	Corrosion Control	7.90	7.90	1.58	7.90
	Education Center	1.29	1.29	1.35	1.29
	Enlisted Dining Facility	1.30	1.30	5.19	1.30
	Exchange Retail Store	4.52	4.52	0.18	4.52
	Fire Station	3.48	3.48	0.00	3.48
	Fitness Center	3.44	3.44	0.86	3.44
	GCE - Inf BN 1 Facilities & HQ	5.94	5.94	1.28	5.94
	GCE - Inf BN 2 Facilities & HQ	0.00	0.00	3.04	0.00
	Law Enf Bn	4.83	4.83	0.00	4.83
	Med/ Den Clinic	1.87	1.87	0.00	1.87
	Outdoor Playing Fields	9.89	9.89	2.96	9.89

	Parking Area (360 Spaces)	1.51	1.51	0.00	1.51
	PEI Warehouse	4.85	4.85	2.05	4.85
	Recreation Center	0.67	0.67	0.16	0.67
	Rel Min Services	2.25	2.25	0.00	2.25
	Sec Bldg/Police Station	4.33	4.33	0.00	4.33
	Transient Quarters	2.00	2.00	1.16	2.00
Cantonment U&SI Phase II		106.84	106.80	66.34	106.80
	9th ESB (-)	1.71	1.71	0.00	1.71
	Artillery Battery	6.38	6.38	2.29	6.38
	Base Warehouse	4.89	4.89	1.83	4.89
	Central Issue Facility	5.11	5.11	0.00	5.11
	Dist Warehouse	7.56	7.56	0.00	7.56
	Ind Combat Skills Training & PLT Battle Course & Gas Chamber	2.93	2.93	6.84	2.93
	GCE Centralized Vehicle Wash Facility	7.05	7.05	0.00	7.05
	GCE - Inf BN 1 Facilities & HQ	8.28	8.28	1.10	8.28
	GCE - Inf BN 2 Facilities & HQ	0.00	0.00	4.52	0.00
	Pass & ID Office	2.44	2.44	0.00	2.44
	Parking Area (360 Spaces)	2.62	2.62	0.00	2.62
	Recycle Center	1.34	1.34	0	1.34
Family Housing at AAFB		10.84	10.84	39.73	8.18
Information Technology/Communications		18.51	23.66	96.86	23.46
	Cantonment U&SI Phase I	0.14	0.14	5.90	0.14
	Cantonment U&SI Phase II	0.03	0.03	0.08	0.03
	Electrical, Wastewater, and Water Off Site Utilities	3.09	4.41	15.89	4.37
Electrical, Wastewater, and Water Off Site Utilities		18.79	29.94	67.65	28.35
	Family Housing AAFB	0.00	0.00	0.09	0.00
Water Well Development Area		90.00	90.00	90.00	90.00
Live Fire Training Range Complex - MPMG		62.63	80.50	27.05	80.50
	Live Fire Training Range Complex - KD Ranges	4.75	13.43	12.34	13.43
Live Fire Training Range Complex - KD Ranges		115.99	134.78	45.96	134.04
Live Fire Training Range Complex - USFWS Relocation		2.88	13.04	0.00	14.42
AAFB - Expand Middle School		0.00	0.00	0.00	0.00
Guam High School Expansion		0.00	0.00	2.08	0.00
MC&FH Finegayan Blue Box Area Outside U&SI Projects		138.31	197.32	144.42	197.32
TOTAL RECOVERY HABITAT IMPACT - FEIS 2010 ROD Related Actions and DSEIS 2014 Project Footprints		**933**	**1072**	**1071**	**1065**

Data Sources: SEIS Blue Box Boundaries Version 5; SEIS Green Boxes Version 1; MC&FH Finegayan CDP (12/19/2013); LFTRC Northwest Field CDP (11/27/13); Andersen South Training Site Plan 4(/2014); Guam Rainbow Chart 3/17/2014

Water Well Development Area - Water Well and Water Lines/Access Roads are Notional, up to 90Ac of impact

APPENDIX B

36 Wing Instruction 32-7004, *Brown Tree Snake Control Plan*

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

36WGI32-7004

BY ORDER OF THE COMMANDER, 36TH WING

36 WG INSTRUCTION 32-7004

DATE: 15 March 2006

Civil Engineering

BROWN TREE SNAKE MANAGEMENT

OPR: 36 CES/CES (Jonathan Wald)

Certified by: 36 CES/DCE (Merlin J. Miller)

Pages: 16/Distribution: F

This instruction implements the ***Brown Tree Snake Control Plan*** prepared under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, the ***Brown Tree Snake (BTS) Control and Interdiction Plan (COMNAVMARIANAS INSTRUCTION 5090.10)*** dated June 2000, and the ***Brown Tree Snake Control and Eradication Act of 2004*** (Public Law 108-384, 108th Congress). The purpose of this instruction is to establish procedures and guidelines to prevent the spread of Brown Tree Snake (BTS) to areas where it is not already established via the AAFB transportation network. It outlines the procedures for cooperative interagency efforts to control and interdict BTS, including Department of Defense (DoD) coordination, support, and documentation of inspections of outgoing aircraft and cargo by United States Department of Agriculture Wildlife Services (USDA WS) personnel. This instruction applies to all personnel assigned, attached, or associated with the 36th Wing (36 WG), its tenant units, and contractors. This publication also applies to US Air Force Reserve and Air National Guard units and other organizations/tenants associated with or residing on Andersen AFB.

Chapter 1

PROGRAM REQUIREMENTS

1.1. Purpose of Program. Brown Tree Snake (BTS) control and interdiction efforts on Andersen are aimed at reducing the risk of dispersal of the BTS, an invasive species causing extensive damage to Guam's ecology, from Guam via the base's transportation network, as well as addressing ongoing and potential BTS threats to biological resources and human health and safety.

1.2. General Roles and Responsibilities. A Memorandum of Agreement, signed by the United States Departments of Defense, Interior, Agriculture, and Transportation, as well as the State of Hawaii, the Government of Guam, and the Commonwealth of the Northern Marianas Islands,

establishes the cooperative relationship between all signatories in administering BTS control and research activities.

1.2.1. Interdiction Program Requirements. All shipments by air or sea of material originating from Andersen AFB facilities for military exercise support, day-to-day military cargo and equipment and private contractors will be inspected by USDA WS personnel and/or their trained snake detection canines and properly document the inspection before transport off-island. All aircraft, military or civilian, taking off from Andersen AFB will be inspected by USDA WS to the maximum extent possible.

1.2.2. Oversight. 36 CES/CEV will designate a BTS Management Liaison responsible for administering the program outlined in this instruction and resolving any issues dealing with BTS management on Andersen AFB.

1.2.3. Role of U.S. Department of Agriculture Wildlife Service. Control and interdiction protocols will be practiced on a daily basis by private sector contractors and military organizations and/or personnel from Guam's USDA WS, which is the primary federal agency responsible for ensuring the BTS does not leave the island of Guam. USDA WS works cooperatively with the Department of Defense to implement proactive control measures aimed at preventing BTS dispersal.

1.2.3.1. All aircraft and cargo destined for off-island locations have a 100% requirement for BTS inspection. USDA WS personnel require a minimum of 2 hours' notice for inspections and will have detector canine teams available 24/7.

1.2.4. Role of Department of Defense. Andersen personnel involved with military training exercises, operational requirements, private contractors and BTS control/interdiction programs will:

1.2.4.1. Plan, direct, and coordinate all cargo handling procedures for cargo departing Guam with consideration for the on-going threat to the Pacific spread of BTS. Cargo handlers and/or managers will work closely with USDA WS personnel to establish and maintain effective cargo and equipment BTS inspection processes. The agency responsible for the BTS inspection or staging area will coordinate for and provide area lighting when needed.

1.2.4.2. Fully cooperate with USDA WS to conduct measures necessary to reduce the BTS snake population at port and cargo facilities through an integrated approach consisting of technical assistance and lethal and non-lethal control methods such as prey base reduction, exclusion, habitat modification, and capture.

1.2.4.3. Provide USDA WS with adequate forward notification of cargo movements that are not part of typical daily operations, as outlined in the corresponding chapters of this instruction, and assist them as necessary to facilitate the timely completion of the mandatory inspection process.

1.2.4.4. As part of major exercise planning, address BTS control and interdiction procedures in the exercise plan's AF Form 813, Request for Environmental Impact Analysis, in consultation with USDA WS.

1.2.5. Education and Awareness Requirements. The 36 CES/CEV BTS Management Liaison will coordinate closely with USDA WS to obtain and disseminate materials related to BTS education and awareness. Units involved with military training exercises, operational requirements, private contractors and BTS control/interdiction programs at Andersen will:

1.2.5.1. Publish and distribute the BTS Emergency Response Protocol. Prominently display contact information and telephone numbers to report BTS sightings (Attachment 1).

1.2.5.2. Conduct information briefings for both permanently assigned and transient personnel based on materials provided by 36 CES/CEV and USDA WS. Explain the potential for impacts if BTS were transported from Guam in military vehicles, cargo and equipment. Explain individual responsibilities if and when a BTS is sighted (kill/capture/immediately report to USDA WS). Use the BTS Awareness instructional videotapes and printed materials, requesting USDA WS participation and/or demonstrations at the briefings when their workloads permit.

1.2.5.3. Provide information cards to personnel as a reminder of the threat and responsibilities for immediate action.

1.2.5.4. Clearly display BTS identification and information posters in tent cities, dormitories, and work sites.

Chapter 2

OUTBOUND AIRCRAFT INSPECTION PROCEDURES

2.1. Requirements. Aircraft departing for off-island destinations are required to undergo 100% BTS inspections by USDA WS personnel with detector canines. USDA WS requires a minimum of 2 hours' notice in order to conduct an aircraft inspection.

2.2. Exemptions. Aircraft flying local missions that are not scheduled to land off-island are exempt from USDA WS inspection.

2.2.1. Since the BTS is nocturnal, quick-turn aircraft that remain on the ground less than 3 hours during daylight do not require BTS inspection.

2.2.2. Commercial aircraft that remain on the ground less than 3 hours during night time (any time on the ground between official sunset and sunrise) will undergo a visual BTS inspection. Commercial aircraft remaining longer than 3 hours will be prepared for a canine inspection. If a canine inspection occurs, the APUs on commercial aircraft will be off.

2.2.3. Urgent missions, such as MEDEVAC, will not be delayed in order to accomplish a BTS inspection. However, every effort will be made to conduct inspections on these aircraft prior to their scheduled departures.

2.3. Incoming Aircrew Notifications. 36 OSS will publish the following notification of BTS inspection requirements in the appropriate Flight Information Publications: "All aircraft departing Andersen AFB are required to have a brown tree snake inspection conducted by USDA WS. Changes in scheduled departure times require three hours' prior notice to ensure timely accomplishment of this inspection."

2.3.1. 36 OSS will require military aircrews with off-island destinations to file their flight plans no later than 3 hours prior to the desired departure time in order to provide enough response time to the USDA WS.

2.3.2. 36 OSS will relay BTS inspection requirements to deployed units during the "Local Area Knowledge" briefing.

2.4. USDA Notifications. Airfield Management (36 OSS/OSAM) will make a printed copy of the consolidated daily flying schedule available to USDA WS no later than 0600 each day. Failure to provide more than 2 hours' notification may result in a stop movement until an inspection can be conducted.

2.4.1. The 734th AMS is responsible for notifying USDA WS of changes to the daily flying schedule for any of the AMC controlled assets. This notification will be made as soon as possible after learning of the proposed change.

2.4.2. The 36 WG Command Post is responsible for notifying USDA WS of changes to the daily flying schedule for any non-AMC controlled assets. This notification will be made as soon as possible after learning of the proposed change.

2.4.3. HSC-25 will coordinate directly with USDA WS to ensure their aircraft with off-island destinations inspected prior to departure.

2.4.4. The 36 OSS will ensure that aircraft inspections are documented in the Access Database upon receipt of an outbound flight-plan. If no inspection is indicated, 36 OSS will coordinate with USDA WS to get the inspection completed. Every effort will be made to avoid departure delays.

2.5. Documentation Requirements. USDA WS will notify 36 WG Command Post upon completion of each aircraft inspection. 36 WG Command Post will annotate completed inspections in the Access database, annotating the entry with the initials or name of the USDA WS personnel making the notification.

2.5.1. Database Access. The Access database will be visible to authorized users within the 36 WG Command Post, 36 OSS, Expeditionary Bomb Squadron, Tanker Task Force, and 734th AMS. USDA WS will be provided information from the database upon request to any authorized user.

2.6. Authority to Stop Movement. The installation Commander has delegated authority to 36 OSS, upon a request by USDA WS made either directly or via the 36 WG Command Post, to stop any aircraft from departing Guam that has not been inspected and/or is suspected to harbor BTS.

2.6.1. The 36 OSS personnel who direct the stop movement will inform the 36 OSS/CC or his designated representative. The 36 OSS/CC or his designated representative will ensure 36 EOG/CC is briefed on the incident.

2.7. Aircraft departing without inspection. If an aircraft departs without having a BTS inspection accomplished, USDA WS will contact the appropriate agencies at its destination and inform them.

2.7.1. The 36 WG Command Post will inform the 36 OSS/CC or his designated representative if any aircraft has departed without the appropriate BTS inspection. The 36 OSS/CC or his designated representative will ensure wing leadership is briefed on the incident.

Chapter 3

AERIAL PORT CARGO INSPECTION PROCEDURES

3.1. General Responsibilities and Requirements. Outbound aerial shipments from Andersen include general freight, household goods, and unaccompanied baggage.

3.1.1. The 734th Air Mobility Squadron (AMS) on AAFB handles all outgoing air freight. Containers are delivered to the 734 AMS warehouse area, where they are then palletized, processed, and eventually loaded onto aircraft.

3.2. Routine cargo inspections. Inspections of outgoing air cargo are conducted at the 734 AMS warehouse area.

3.2.1. 734 AMS personnel will inspect all originating boxes for holes, punctures, damage and/or cracks that may permit BTS access and inspect all shipments throughout the selection, palletizing, building and loading process. 734 AMS personnel will handle and stack each sealed box individually while building up pallets.

3.2.1.1. 734 AMS will ensure all personnel receive initial in-depth training on procedures to follow upon spotting a BTS and coordinate with WS for periodic follow-up BTS awareness training sessions. Personnel will remain alert for BTS signs or opportunities at all times.

3.2.2. USDA WS will perform routine sweeps of the 734 AMS warehouse and cargo yard grid three times daily, M-F, and twice daily, Sat-Sun, and maintain a log book in the dispatch area that details their inspection dates and times.

3.3 USDA Notifications. 734 AMS load planners will notify USDA WS when load plans are complete, approximately 4-6 hours before departure. Notification will be either in person if USDA WS personnel are present or by phone when necessary.

3.4. Documentation Requirements. The 734 load planner will annotate the load plan with the time and name of the person notified. Upon completion of the inspection, USDA WS will notify 36 WG Command Post. 36 WG Command Post will update the central inspection database accordingly.

3.5 Authority to Stop Movement. The installation Commander has delegated authority to 36 OSS Commander or his designated representative, upon a request by USDA WS made either directly or via the ATOC, to stop any aircraft from departing Guam with any cargo or equipment that has not been inspected and/or is suspected to harbor BTS. 734 AMS ATOC personnel should notify USDA WS and 36 OSS Airfield Management if cargo about to be loaded onto an aircraft or vehicle has not undergone the appropriate BTS inspection.

Chapter 4

MUNITIONS SHIPMENT INSPECTIONS

4.1. Requirements. Munitions movements typically consist of either break-bulk/uncontainerized or International Organization for Standardization (ISO) container movements that are transported to Kilo Wharf on COMNAVMARIANAS, or those which are loaded directly onto aircraft at Andersen AFB. MUNS will schedule BTS inspections through USDA WS in order to better coordinate any munitions activities going on the same day.

4.2. Break-bulk/uncontainerized munitions:

4.2.1. Munitions pallets will be staged in an area conducive to USDA WS BTS inspections prior to on loading onto trailers for transport to Kilo Wharf.

4.2.2. USDA WS canine inspections will be conducted on the munitions while at the staging area before they are loaded.

4.2.3. Munitions will not be loaded on trailers which are not ready for immediate transport (within the same day). Munitions that have been exposed to the environment (not sealed in containers) overnight must be re-inspected by USDA WS prior to transport.

4.3. ISO containers:

4.3.1. Munitions will be staged in an area conducive to USDA WS BTS inspections prior to loading into the containers.

4.3.2. USDA WS canine inspections will be conducted on the munitions while at the staging area before they are loaded into the containers.

4.3.3. Containers not fully loaded, which are to be left unattended overnight, will be sealed after the last USDA WS BTS inspected munitions are loaded into the ISO container. All munitions that were not sealed in containers overnight must be inspected before loading continues on the following day.

4.3.4. Munitions destined for movement via aircraft will be coordinated through the 734 AMS and USDA WS for the BTS inspection prior to loading.

4.4. USDA Notifications. 36 MUNS will attempt to provide an estimated shipping date to USDA a minimum of 30 days out, for most large munitions shipments (i.e. Turbo CADS). Given that this projected date will be tentative, USDA WS will request further updates from MUNS, who will provide a firm target date for all munitions shipments at least 7 days in advance (unless MUNS receives less notice, in which case they will notify USDA WS immediately after learning of the short-notice shipment) and a minimum of 3 hours' notice for any inspections desired on that date.

4.5. Documentation Requirements. 36 MUNS personnel will make an entry in the BTS log located in the crew chief book that identifies the USDA WS inspector for that day's shipment and the approximate time the inspection was conducted, which will then be initialed by the handler conducting the inspection. Before the close of each day in which USDA WS has inspected munitions, USDA WS will coordinate with 36 MUNS to schedule an end-of-day verification of loaded munitions status. At the end of each day, 36 MUNS will make an entry in the BTS log located in the crew chief book verifying that all containers containing munitions packed for shipment have been closed prior to darkness, and the approximate time those containers were closed; USDA WS will authenticate this entry by initialing it.

Chapter 5

TMO SHIPMENTS

5.1. Requirements. Containerized household goods and unaccompanied baggage shipments for Air Force personnel and DOD civilians departing from Andersen AFB, as well as other items scheduled to leave Guam via surface vessel, are managed by Andersen's Transportation Management Office (TMO). When items are shipped by surface vessel, only those containerized prior to transportation to the waterport are addressed by this instruction.

5.1.2. The packing and loading of all household goods at Andersen, including unaccompanied baggage, is accomplished by carriers/local agents before the goods are surface-transported to the port for shipping. USDA WS will promote BTS education and training to local agent/carrier employees.

5.1.3. Items that are of greatest concern are those that have been stored outdoors or in carports and sheds, such as washers, dryers, swing set tubing, lawnmowers, barbeque grills, lumber, pipes, garden hoses, and vehicles. Personnel will be briefed by the TMO that USDA WS will be at the residence to inspect for the presence of BTS.

5.2. Prioritization. Although USDA WS will make every reasonable effort to perform HHG inspections, since HHG are packed at several geographically separated locations simultaneously, USDA WS will prioritize inspections based upon a risk analysis, conducting daily inspections on shipments deemed to pose the largest risk first. Risk factors they consider include packout location, shipment size (shipments of less than 4,000 pounds present a negligible risk), destination (Hawaii and Diego Garcia have the highest priority), and contents (large quantities of goods and equipment stored outdoors carries a higher risk).

5.3. USDA Notifications. TMO will provide USDA WS with a schedule of the upcoming week's HHG packouts and any other container movements every Friday; in addition, they will provide a detailed schedule every day by COB that identifies the type of shipment, carrier, and estimated weight for each of the next day's packouts and container movements.

5.4. Documentation Requirements. USDA WS will make a copy of the weekly schedule and annotate each shipment that was inspected with the inspector's name or initials. USD WS will provide this documentation to TMO ten (10) days later (the following Monday). TMO will maintain these documents on file for at least one year after completion.

5.5. Outbound Privately Owned Vehicles. A significant component of the PCS movement process, personally-owned vehicles (POVs) are handled through a single facility at COMNAVMARIANAS. Vehicles departing Guam are not inspected at Andersen.

5.5.1. USDA WS will conduct canine inspections daily (Monday-Friday) on outbound vehicles at the COMNAVMARIANAS POV lot before being packed directly into 20' or 40' containers and trucked to the Commercial Port for loading onboard a civilian cargo ship. If a vehicle is

inspected but not loaded prior to the close of business on a given day, USDA WS will conduct a follow-up inspection the next business day.

Chapter 6

HSC-25 AIRCRAFT INSPECTION PROCEDURES

6.1. Requirements. Since the BTS is nocturnal; maintenance personnel are present on the flight line in large numbers during the daytime; and pre-flight visual inspections are conducted; a morning inspection of HSC-25 aircraft by USDA WS is considered valid for all flights that take off during daylight hours that same day.

6.1.1. USDA WS inspections of HSC-25 aircraft will be conducted daily prior to the beginning of each day's scheduled flights. To the maximum extent possible, inspections will be conducted at a regular, recurring time as agreed upon by HSC-25 and USDA WS. To ensure timeliness and efficiency, only those aircraft identified by HSC-25 Maintenance Control as viable for flight operations will be inspected. The inspection time will be pre-coordinated between HSC-25 and USDA WS personnel and an HSC-25 Plane Captain will accompany the USDA WS inspector during the inspection to ensure the safety of all personnel and aircraft inspection integrity.

6.1.2. During pre- and post-flight inspections, the inspection of all bays and access panels will include a visual check for potential BTS. In addition, maintenance personnel who are servicing aircraft, conducting daily inspections, and troubleshooting maintenance discrepancies will remain vigilant for BTS incursion. At the completion of daily maintenance, maintenance personnel will ensure all intakes are plugged and all door/panels are secured, which should greatly reduce the possibility of nighttime BTS entry.

6.2. Exemptions. Any aircraft flying missions that are not scheduled to touch down off-island are exempt from USDA WS inspection.

6.2.1. Emergency response exemption. Since delaying an immediate launch for SAR or MEDEVAC is potentially life-threatening to the victim(s), HSC-25 will not delay such missions in order to be inspected. HSC-25 is responsible for informing USDA WS of the short-notice mission upon receipt; if the inspection is not conducted, USDA WS is responsible for making any notification to agencies they deem applicable at the intended destination.

6.3. USDA Notifications. HSC-25 will provide USDA WS a Flight Schedule the evening prior to each Fly Day. The Flight Schedule will annotate the BTS Inspection Time as coordinated between HSC-25 and USDA WS, as well as any known missions that will require HSC-25 to put wheels down anywhere other than Guam soil.

6.3.1. HSC-25 will notify USDA WS of any changes to this schedule when they involve an aircraft taking off during the hours of darkness, at the earliest opportunity once HSC-25 is aware of the change. HSC-25 will also notify USDA WS of any short-notice/emergency flights that would normally require inspection as soon as feasible, but will not delay an emergency response in order to receive an inspection.

6.3.1. **Cargo Inspection Notifications.** HSC-25 routinely moves cargo for NSWU-1, EODMU-5 and MSS-7, as well as MSC and AF SFS. Any unit transporting cargo via HSC-25 is responsible for clearing their own cargo through USDA WS prior to it being transported to or by HSC-25.

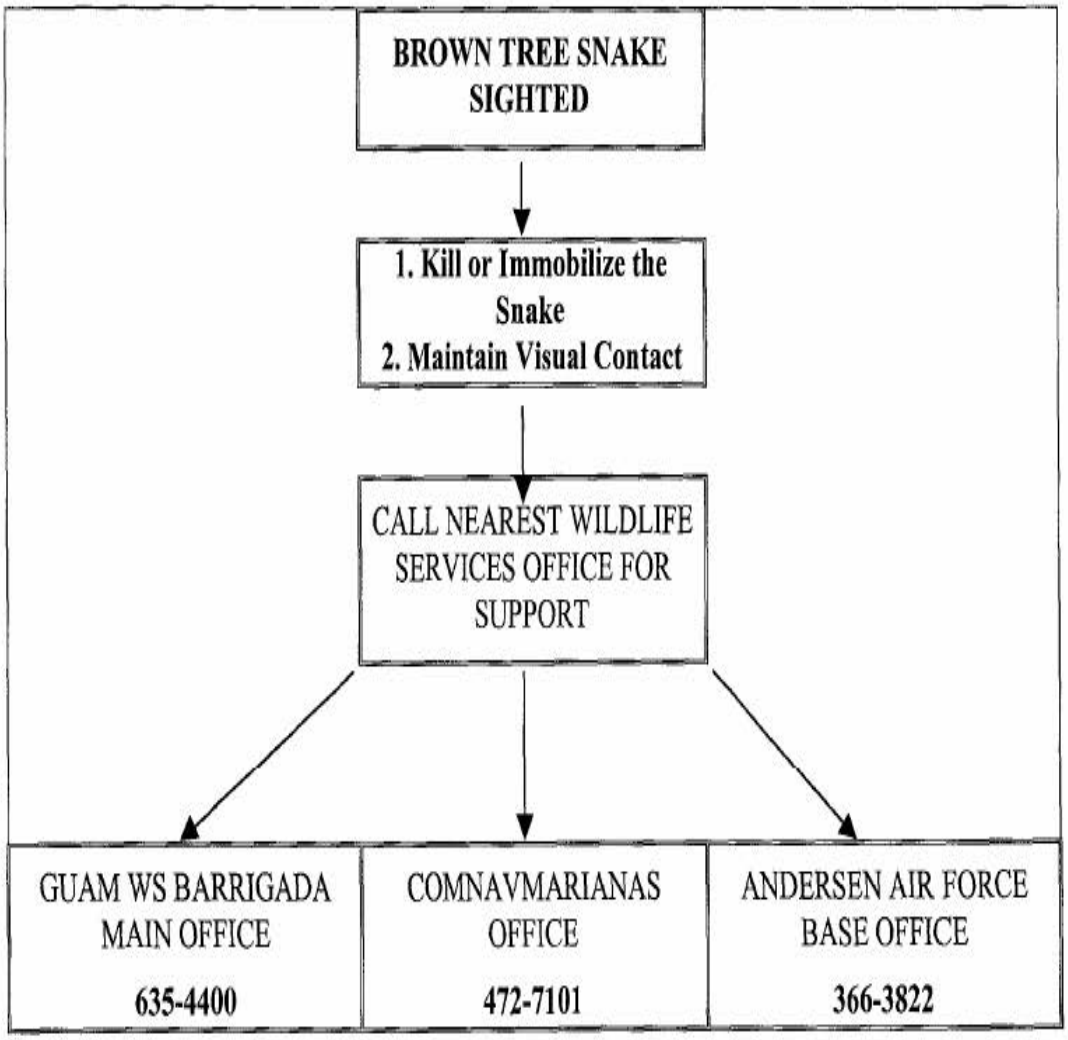
6.3.2. HSC-25 will inform units making requests for cargo transportation of the USDA WS inspection requirement. Units are responsible for notifying USDA WS of the cargo location and estimated pickup time NLT 3 hours prior to the intended pickup time.

6.3.3. HSC-25 will also brief USDA WS inspectors of any known cargo transport missions during their morning inspection, to assist USDA WS in making arrangements for an inspection with the unit that owns the cargo.

6.4. Documentation Requirements. USDA WS will notify 36 WG Command Post upon completion of HSC-25 aircraft inspections, using the tail numbers of inspected aircraft as a reference. 36 WG Command Post will annotate completed inspections in the Access database, annotating the entry with the initials of the USDA WS personnel making the notification.

MICHAEL R. BOERA, Col, USAF
Commander, 36th Wing

Table 1: BTS Emergency Response Procedures



* This chart refers to brown tree snakes found in cargo and cargo or flightline areas only. If brown tree snakes are found in residential areas there is no need for residents to notify Wildlife Services. Residents can just kill and dispose of the snake.

Attachment 2. BTS Inspection Contact Information.

Subject: USDA Canine Inspection Contact Phone Numbers

Date: March 15, 2006

To: All Cooperators

USDA-Wildlife Services canine inspection hours and contact telephone numbers are listed below. Please take note of the different telephone numbers for locations north and south of the village of Hagatna.

MONDAY-FRIDAY

	North of Hagatna	South of Hagatna
2200 – 0530 hrs:	888-5708	888-5706
0530 – 2200 hrs:	888-5707	888-5705

SATURDAY-SUNDAY
Call 888-5705 or 888-5709 regardless of location.

If no message can be left at the phone numbers listed above, please try to contact our Andersen AFB Team Leader at 888-5713, or Navy Team Leader at 888-5727 to schedule an inspection.

If you have any questions or concerns in regards to this memo, please feel free to contact me at Andersen AFB at 366-3822.

Sincerely,

Jason C. Gibbons
Supervisory Wildlife Biologist
Canine Program Manager, Acting
USDA/APHIS/Wildlife Services, Guam

APPENDIX C

COMNAVMAR Instruction 5090.10A, Brown Tree Snake Control and Interdiction Plan

DEPARTMENT OF THE NAVY
COMMANDER, U.S. NAVAL FORCES MARIANAS
PSC 455, BOX 152
FPO AP 96540-1000

IN REPLY REFER TO
COMNAVMARIANASINST 5090.10A
N45
14 FEB 2005

COMNAVMARIANAS INSTRUCTION 5090.10A

Subj: BROWN TREE SNAKE CONTROL AND INTERDICTION PLAN

Ref. (a) Executive Order 13112, Invasive Species
(b) OPNAVINST 5090.1B
(c) COMNAVMARIANASINST 3500.4

Encl: (1) Brown Tree Snake Control and Interdiction Plan

1. Purpose. To outline specific responsibilities and establish policy for coordination and procedures governing the control and interdiction of brown tree snakes on Navy installations on Guam and during military training within the Commander, U.S. Naval Forces Marianas (COMNAVMARIANAS) Area of Responsibility (AOR).

2. Cancellation. COMNAVMARIANASINST 5090.10. This instruction has been changed in its entirety.

3. Scope. This instruction provides guidance and direction to prevent the dispersal of brown tree snakes from Guam to other locales via military sea and air shipments of personnel, equipment, and cargo. Its provisions are applicable to all activities in the COMNAVMARIANAS AOR who directly or indirectly have responsibility for military sea and air shipments. This instruction issues a revised Brown Tree Snake Control and Interdiction Plan that is to be followed during the planning and execution of any movement of military sea and air shipments, including personnel. This instruction applies to Guam Installation Commanders, Major Exercise Commanders, Training Unit Commanders, and all military Flight Crews.

4. Background. Per reference (a), COMNAVMARIANAS is responsible for not causing or promoting the introduction or spread of invasive species in the United States or elsewhere. The brown tree snake is an alien species to the United States, including Guam, whose introduction has caused significant economic and environmental harm; consequently, it is classified as an invasive species. Per reference (b), the Navy is required to ensure military readiness and sustainability while complying with natural resources protection laws, and conserving and managing natural resources in the United States, its territories, and possessions. This dual dynamic of stewardship and readiness is essential for the long-term maintenance of

military and natural resources sustainability. Per reference (c), COMNAVMARIANAS is the controlling and scheduling authority for Navy-owned and controlled training areas and services in the Mariana Islands. The dispersal of brown tree snakes from Guam to other locales is a serious economic and environmental threat. Preventing dispersal of brown tree snakes in military sea and air cargo is a priority for COMNAVMARIANAS.

5. Action

a. The sponsoring office for this order, the Assistant Chief of Staff, Facilities and Environmental (ACOS N4) is responsible for environmental oversight of all actions, including military training, within the COMNAVMARIANAS AOR. The ACOS N4 is responsible for environmental evaluation of potential environmental impacts, determining the measures necessary to protect the environment and preserving the long-term maintenance of military and natural resources sustainability. The ACOS N4 will advise the Commander of any changes in the handling and movement of military sea and air shipment cargo, and any changes in military training constraints necessary to prevent the dispersal of brown tree snakes in military sea and air shipments. The ACOS N4 will work in close coordination with the Assistant Chief of Staff, Operations (ACOS N3).

b. The ACOS N3 is responsible for scheduling and oversight of supplies and port services and operations, and for the scheduling and oversight of training. The ACOS N3 will accomplish all specified requirements described herein.

c. The Assistant Chief of Staff, Ordnance Operations (ACOS N2) is responsible for preparing and staging munitions for shipment from Guam. The ACOS N2 will accomplish all specified requirements described herein.

d. Regional supported activities, including but not limited to, DRMO Guam, NMCB DET Guam, and MSCO Guam will:

(1) Review the Brown Tree Snake Control and Interdiction Plan and identify and incorporate into local plans all necessary control and interdiction measures, and fully cooperate with federal authorities during observations and inspections of equipment and cargo being prepared and staged for shipment from Guam.

(2) Ensure that personnel assigned to preparation and handling of equipment and cargo scheduled for shipment from Guam are knowledgeable and adhere to the information contained in the

Brown Tree Snake Control and Interdiction Plan and directives pertaining to inspection of outbound equipment and cargo.

(3) Comply with the mandatory regulations and direction contained in the Brown Tree Snake Control and Interdiction Plan when preparing equipment and cargo for shipment from Guam.

e. Commanding Officers/Officers-in-Charge of training units will:

(1) Review the Brown Tree Snake Control and Interdiction Plan and identify and incorporate into training plans all necessary control and interdiction measures, and fully cooperate with federal authorities during observations and inspections of equipment and cargo being prepared and staged for shipment from Guam.

(2) Ensure that personnel assigned to preparation and handling of equipment and cargo scheduled for shipment from Guam are knowledgeable and adhere to the information contained in the Brown Tree Snake Control and Interdiction Plan and directives pertaining to inspection of outbound equipment and cargo.

(3) Comply with the mandatory regulations and direction contained in the Brown Tree Snake Control and Interdiction Plan when preparing equipment and cargo for shipment from Guam.

6. Applicability. This order applies to all commands, organizations, units, and activities authorized use of Navy lands and facilities, training areas, and ranges controlled by COMNAVMARIANAS.

7. Certification. Reviewed and approved this date.

R. A. McNAUGHT
Chief of Staff

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14 FEB 2005

BROWN TREE SNAKE CONTROL AND INTERDICTION PLAN

Prepared by:
Commander U.S. Naval Forces Marianas
Facilities & Environment, N45

August 2004

ENCLOSURE (1)

14 FEB 2005

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ACRONYMS and ABBREVIATIONS

AAFB	Andersen Air Force Base
AMSS	AAFB Mobility Support Squadron
APHIS	Animal and Plant Health Inspection Service
BTS	Brown Tree Snake
CECG	Combined Exercise Command Group
CESG	Combined Exercise Support Group
CNMI	Commonwealth of the Northern Mariana Islands
COMNAVMARIANAS	Commander, Naval Forces Marianas
GDAWR	Guam Division of Aquatic and Wildlife Resources
DLNR	Department of Land and Natural Resources
DOD	U.S. Department of Defense
DOI	U.S. Department of Interior
FISC	Fleet Industrial Supply Center
GovGuam	Government of Guam
HDOA	Hawaii Department of Agriculture
MI	Military Inspector
MILVAN	Military (cargo) Van
MOA	Memorandum of Agreement
PHNSY	Pearl Harbor Naval Shipyard
PM	Pest Management (USAF)
PMRF	Pacific Missile Range Facility
USAF	United States Air Force
USAG-HI	United States Army Garrison, Hawaii
USARPAC	United States Army, Pacific
USCOMPAC	Commander, U.S. Pacific Command
USCOMPAC REP	USCOMPAC Representative
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS/CSU	U.S. Geological Survey/Colorado State University, Brown Treesnake Project
USGS/RRT	U.S. Geological Survey, Rapid Response Team
WACSA	USDA-WS Approved Cargo Staging Area
WS	(USDA) Wildlife Services

BROWN TREE SNAKE
CONTROL AND INTERDICTION PLAN

I. INTRODUCTION

Purpose

Control and interdiction of the brown tree snake (*Boiga irregularis*), hereafter referred to as BTS, is absolutely essential to prevent the dispersal of BTS from Guam to other locales via military sea and air shipments of personnel, equipment and cargo. The control and interdiction protocols are practiced on a daily basis by military organizations permanently stationed in Guam. The purpose of this plan is to disseminate these procedures to resident and transient organizations, and to emphasize the threat and need to prevent BTS movement from Guam to other areas at risk during military training activities. These preventive practices are particularly crucial during shipments to the Commonwealth of the Northern Mariana Islands (CNMI), Hawaii, and other locations where the BTS has no natural population controls. Therefore, the primary objectives of BTS control and interdiction are to reduce the ongoing and potential threats to human health and safety, biological resources, and impacts to island economies.

The Brown Tree Snake Threat

The BTS is a native species of Indonesia, New Guinea, the Solomon Islands, and Australia that was inadvertently introduced in Guam sometime between the mid-1940s and early 1950s. Since its introduction, the population of BTS has expanded to encompass the entire island's rural and urban areas. The BTS has caused or has been a major factor in the extirpation of most of Guam's native terrestrial vertebrates, including lizards and 9 of 11 endemic/native forest and water birds. In addition, the BTS has caused more than a thousand power outages, preyed on poultry and household pets, and has bitten numerous children.

High densities of snakes occur throughout Guam, and in areas where cargo is loaded for transport by air and sea. BTS characteristics such as being able to survive for long periods of time without food, and habitually seeking out small dark places as refugia, work synergistically to give a higher probability for successfully transporting BTS to other islands/regions. Due to the possibility of sperm storage, a single female BTS can potentially start a population. The potential spread of BTS from Guam via cargo movements is a serious concern due to Guam's role as a trans-Pacific shipping hub and the delicate environments of islands that receive cargo.[1] BTS sightings have been recorded in locations ranging from - Oahu in Hawaii, Tinian, Rota, and Saipan in the CNMI, Marshall Islands, Okinawa, Diego Garcia, Wake Island, Spain, Alaska and Texas. There is no documentation supporting any established populations of BTS in any of these locations. However, detecting BTS populations at low densities is extremely difficult.

[1] USDA et al.1996. *Environmental Assessment for Brown Tree Snake Control Activities on Guam.*

II. FEDERAL AUTHORITY AND DIRECTION

1990: Federal funding for BTS interdiction and control initiated.

1990: U.S. Congress incorporated specific direction into the Nonindigenous Aquatic Nuisance Prevention and Control Act regarding the control of BTS in coordination with regional, territorial, state, and local entities in Guam and other areas where the species is established outside of its historic range.

1993: A 5 year Memorandum of Agreement (MOA) between U.S. Department of Agriculture (USDA)[2], the U.S Department of the Interior (DOI), the U.S. Department of Defense (DOD), the Government of Guam (GovGuam) and the State of Hawaii to coordinate BTS research and establish the USDA Animal Damage Control program.

1996: The Commonwealth of the Northern Mariana Islands (CNMI) added to the 5 year MOA.

1999: Department of Transportation and the Department of Commerce added to 5 year MOA.

1999: President Clinton signed Executive Order 13112, "Invasive Species"[3]. The executive order directed federal agencies to (1) prevent, detect, and respond to control populations of invasive species; (2) to monitor invasive species populations; (3) to provide for restoration of native species and habitation in ecosystems that have been invaded; (4) to conduct research and develop technologies to prevent introduction and to control invasive species; and, (5) to promote public education on invasive species.

III. DOD BTS ACTIONS IN THE MARIANA ISLANDS

BTS contamination can occur during any cargo shipment or personnel scenario. COMNAVMARIANAS and Commanding Officer, 36th Air Base Wing, Andersen Air Force Base, are responsible for carrying out a viable plan to meet a full spectrum of potential BTS cargo contamination at Guam's military ports. COMNAVMARIANAS and 36th ABW are fully supported in these actions by the USDA Wildlife Services (WS).

Other cooperative agencies that support COMNAVMARIANAS and 36th ABW BTS control and interdiction efforts include DOI, U.S. Fish and Wildlife Service (USFWS), the U.S. Geological Survey/Colorado State University Brown Treesnake Project (USGS/CSU), the Guam Department of Agriculture's Division of Aquatic and Wildlife Resources (GDAWR), the CNMI Department of Land and Natural Resources (DLNR), and the State of Hawaii Department of Agriculture (HDOA).

[2] In 1997, USDA Animal Damage Control (ADC) became the USDA Animal and Plant Health Inspection Services (APHIS) Wildlife Services (WS), and is the office presently responsible for integrated wildlife damage management.

[3] "Invasive species" means a species not native to an ecosystem that does or is likely to cause economic or environmental harm or harm to human health.

The COMNAVMARIANAS BTS Control and Interdiction Plan has been implemented and evaluated during major inter-island exercises, as well as numerous small scale operations and daily operations. The control and interdiction procedures were reevaluated as part of a Commander, U.S. Pacific Command (USCOMPAC) Final Environmental Impact Statement that assessed potential impacts of all military training exercises throughout the Mariana Islands. The lessons learned from these major exercises and the results of other environmental evaluations have been incorporated in this plan. COMNAVMARIANAS sponsors annual reviews of BTS control and interdiction protocols with federal, territorial and commonwealth agencies to evaluate additional lessons learned and new technologies that may be adopted in the Mariana Islands.

IV. RESPONSIBILITIES

The following categorized responsibilities provide a foundation for action by certain agencies or individuals involved with Guam military training exercises and BTS control/interdiction programs. Due to turnover experienced by all military units, the responsibilities relating to BTS threat awareness instruction will often be repetitious to ensure that all persons training in the Mariana Islands are fully knowledgeable of individual and command responsibilities.

A. Guam Installation Commanders

COMNAVMARIANAS and Commander, 36th Air Base Wing are responsible for the conduct of BTS control and interdiction on Navy and USAF installations, respectively, and supported daily by the Guam WS permanent staff assigned to COMNAVMARIANAS and Andersen Air Force Base. The installation commanders are responsible to keep WS informed of activities that will require their support. Specific command responsibilities are as follows:

1. Fully cooperate with WS to conduct measures necessary to reduce the BTS snake population at port and cargo facilities through an integrated approach consisting of technical assistance and lethal and non-lethal control methods such as exclusion, habitat modification, capture and prey base reduction.

2. Plan, direct, and coordinate all cargo handling procedures for cargo departing Guam with consideration for the on-going threat of the pan-Pacific spread of BTS.

3. Consult with WS to determine the necessity to establish USDA-WS approved cargo staging areas (WACSA).

4. Direct cargo handlers and/or managers to work closely with WS personnel to establish and maintain an effective cargo and equipment BTS inspection process.

5. Publish and distribute the BTS Emergency Response Protocol. Prominently display contact information and telephone numbers to report BTS sightings (see Table 1).

6. Conduct information briefings for both permanently assigned and transient personnel. Explain the potential for impacts if BTS were transported from Guam in military vehicles, cargo and equipment. Explain individual responsibilities if and when a BTS or any other snake species is sighted (kill/capture/immediately report to WS). Other snake species can be dangerous.

7. Clearly display BTS identification and information posters in tent cities, barracks and work sites. Use the BTS Awareness instructional videotapes and printed materials, requesting WS participation and/or demonstrations at the briefings when their workloads permit. Provide information cards to personnel as a reminder of the BTS threat and responsibilities for immediate action.

8. For major exercises, include BTS control and interdiction procedures in the exercise plan's Environmental Awareness Annex. Include in the annex, a copy of the information cards to be distributed to training personnel that will define applicable environmental protective measures, including the BTS protocol.

9. In consultation with WS, direct the sites to be used for tent cities and staging areas for vehicle, cargo pallets and containers, and other equipment.

10. Provide vehicle washing areas and high-pressure wash equipment when needed.

11. Designate areas to be used for inspecting vehicles after they have been cleaned and prior to movement to WACSAs or immediate loading aboard aircraft and/or ships.

12. Provide area lighting at WS approved designated inspection and staging areas.

13. Assist WS to facilitate the mandatory 100 percent inspection of all outbound cargo by detector dog teams.

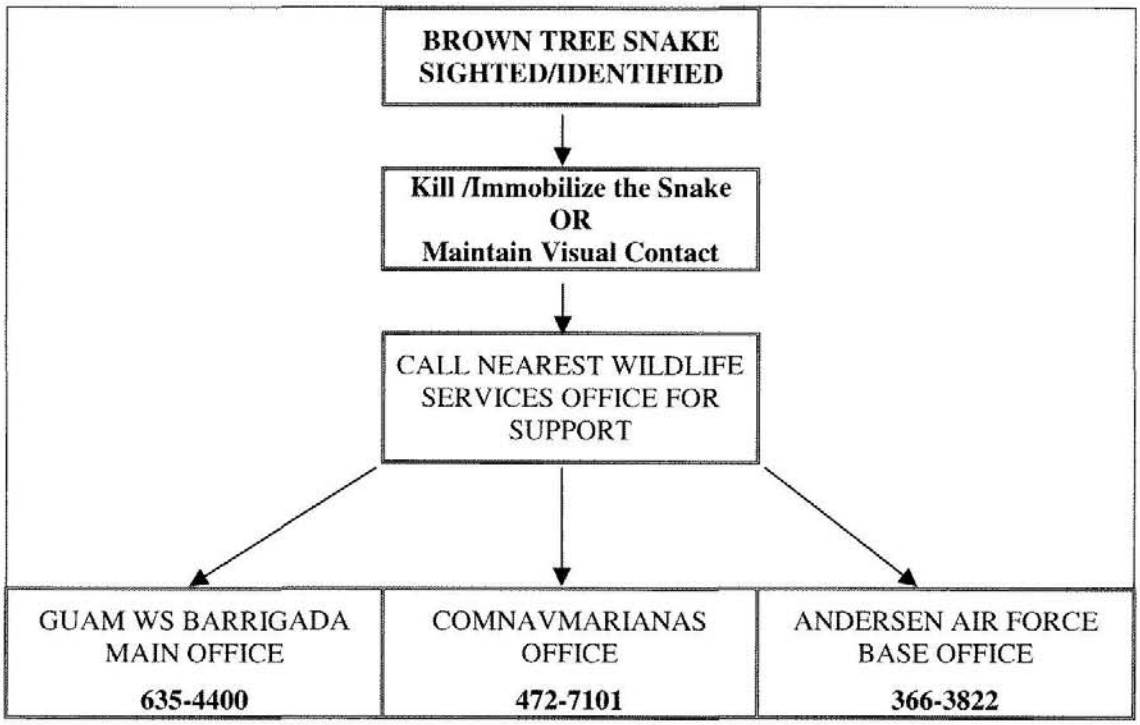
14. For major exercises, assign members of the base environmental staff with experience in conducting BTS protocol as members of the Combined Exercise Command Group (CECG) and the Combined Exercise Support Group (CESG).

15. Provide personnel and logistic support to augment BTS protocol activities as needed.

16. For major exercises and in coordination with WS, enhance rodent control measures and grounds maintenance practices that reduce the potential for BTS activity/presence in areas selected for vehicle and cargo staging.

17. During day-to-day cargo inspections, the installation commander may authorize WS to stop any cargo carrier from departing Guam with any cargo or equipment suspected to harbor BTS.

Table 1: BTS Emergency Response Procedures for Guam Cargo Stations



NOTE: Cellular phone numbers will be provided to exercise units during field exercises to ensure WS can be contacted at any hour.

B. Major Exercise Commanders

The CECG and CESG conducting major exercises are tasked with a variety of responsibilities to support the exercise force. Logistics coordination in response to command direction is the responsibility of the CESG. Early coordination with WS is required to incorporate BTS control and interdiction requirements into the exercise logistic support plans. In regard to BTS control and interdiction, the CECG/CESG will:

1. Work with the Installation Commander and WS when necessary to establish a WACSA for personal and unit equipment, and vehicle staging.

2. Work with the AAFB commander and WS to develop an aircraft parking plan that will minimize potential exposure of aircraft to BTS.

3. Supervise the BTS control and interdiction process by providing environmental monitors as needed.

4. Schedule and monitor BTS control and interdiction briefings for all training units upon arrival.

5. Identify to WS the logistics staff personnel who will be responsible for cargo handling operations and BTS response.

6. Provide WS the authority to stop any cargo carrier from departing Guam with any cargo or equipment suspected to harbor BTS.

C. Training Unit Commanders

Regardless of the size of training exercises, commanders of resident and transient organizations will request support from the Installation Commander (and/or the CECG and CESG) when tasked with establishing tent cities, staging areas, and areas for inspecting personnel, vehicles and cargo prior to shipment from Guam (see Section E below for a listing of WS assistance and service that are provided to training units). The commanders of training units will:

1. Ensure that installation staff or CESG conduct BTS control and interdiction information briefings for exercise personnel.

2. Distribute BTS information packets that include the Emergency Response Protocols in case of actual or suspected snake sightings.

3. Coordinate with the on-site commanders to obtain wash down facilities and inspection areas. 36th ABW may provide portable high-pressure washers and a cleaning area. Future plans include repair of a 36 Transportation Squadron vehicle washing area.

4. Identify key personnel responsible for cargo staging, handling and inspection to the installation commander/CESG and ensure their cooperation with WS personnel.

5. Provide additional information to cargo handlers to increase their levels of BTS awareness. Cargo handlers are the first-line of defense against BTS in military cargo. Request assistance from WS to review the following:

   a. History of BTS on Guam, the threat to the environment, action taken to control and interdict BTS, and the goals of existing programs. (Use the USDA video).

   b. A description of implementation efforts on base.

c. A demonstration by the WS detector dog team.

d. A live BTS to enhance immediate recognition.

e. A review of proper methods to kill or capture the snake.

f. Information cards.

6. Supervise the equipment and vehicle cleaning and inspection prior to moving items to the staging area for WS inspections.

7. Provide WS complete access to staged cargo and equipment, opening any containers as requested for a WS internal inspection.

8. Designate personnel as inspectors to assist during WS and cargo handling personnel during personnel, vehicle, cargo and equipment cleaning and inspection.

9. Ensure that all ships and aircraft departing from Guam for overseas and airports are inspected by WS.

10. Prior to breaking camp and off-island departure, ensure that personal belongings, tents and canvas used/staged in bivouac areas have been inspected for BTS presence by WS. Ensure that all personnel conduct inspections of their individual equipment (hand-carried/back-packed/sea-bags). Request WS assistance prior to breaking camp.

D. Flight Crews

Supporting aircraft may be staged at the AAFB parking apron. Supporting aircraft will not be staged overnight at Orote airfield. When idle, the doors of the aircraft will be closed so that BTS cannot enter the aircraft interior. During pre-flight inspections, flight crews should be alert for potential BTS on aircraft. Request WS assistance as needed.

E. USDA APHIS Wildlife Services Support in Guam

USDA APHIS field operations in Guam are conducted by Wildlife Services (WS) staff consisting of Wildlife Biologists, WS Specialists, and snake detector dogs. Logistic support is available to Guam from the WS staff in Yakima, Washington, who make and store equipment and snake traps.

WS BTS control and interdiction efforts are conducted at all commercial and DOD ports for day-to-day cargo shipments. In support of military exercises, WS inspection and containment efforts are enhanced, and WS will:

1. Conduct a 100 percent canine inspection of all outbound aircraft and surface cargo.

c. A demonstration by the WS detector dog team.

d. A live BTS to enhance immediate recognition.

e. A review of proper methods to kill or capture the snake.

f. Information cards.

6. Supervise the equipment and vehicle cleaning and inspection prior to moving items to the staging area for WS inspections.

7. Provide WS complete access to staged cargo and equipment, opening any containers as requested for a WS internal inspection.

8. Designate personnel as inspectors to assist during WS and cargo handling personnel during personnel, vehicle, cargo and equipment cleaning and inspection.

9. Ensure that all ships and aircraft departing from Guam for overseas and airports are inspected by WS.

10. Prior to breaking camp and off-island departure, ensure that personal belongings, tents and canvas used/staged in bivouac areas have been inspected for BTS presence by WS. Ensure that all personnel conduct inspections of their individual equipment (hand-carried/back-packed/sea-bags). Request WS assistance prior to breaking camp.

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WS BTS control and interdiction efforts are conducted at all commercial and DOD ports for day-to-day cargo shipments. In support of military exercises, WS inspection and containment efforts are enhanced, and WS will:

1. Conduct a 100 percent canine inspection of all outbound aircraft and surface cargo.

2. Identify, purchase, operate, and maintain BTS control tools such as snake handling equipment, snake traps, and snake barriers. Barrier fencing is used to erect a WACSA at a port of embarkation on Guam (to keep snakes out of inspected cargo) and a containment area (to keep any snakes in) at the port of debarkation on Tinian. Other tools may be used as needed to accommodate special circumstances and situations.

3. Determine snake-trapping strategies by topographical features and proximity to cargo staging, handling, or processing areas. The BTS trap is a modified minnow trap with a mouse as an attractant within an inner chamber that is inaccessible to snakes. The trap is routinely restocked with food and moisture source for the mouse. The self-setting traps have one-way entrances on either end and are designed for multiple captures.

4. Assign WS personnel and detector dog teams 24 hours/7-days per week during deployment and post-exercise redeployment activities.

5. Use handheld spotlights to walk the perimeter at night to detect and capture BTS, and use detector dog teams to inspect shipments trucked into staging area.

To ensure effective communication with exercise participants, WS will rely on a close working relationship with military cargo managers, appropriate installation commanders, and training unit commanders, and the military commanders keeping WS informed of ongoing and future activities.

USDA WS may be contacted one of three offices on Guam: Andersen AFB Office (366-3822), Barrigada Heights District Office (635-4400), and COMNAVMARIANAS Office (472-7101). The supervisory office in Honolulu can be reached at (808) 861-8576. Cell phone numbers will be published prior to major exercises to ensure WS personnel on Guam and Tinian can be reached 24 hours a day

F. USGS/Colorado State University, Brown Treesnake Project (USGS/CSU)

The U.S. Geological Survey/CSU's Brown Treesnake Project may provide technical assistance to WS. BTS specialists in USGS/CSU may be called upon to provide technical assistance on barrier deployment and construction, trapping efficacy, population levels, special problems with visual or trap-capture of small snakes in dense vegetation, etc. The USGS-Rapid Response Team (RRT) can be requested by local government agencies to respond to any snake sightings outside of Guam.

V. CONTROL, CLEANING, AND INSPECTION PROCEDURES

The possibility of the inadvertent importation of the BTS to other areas of the world is always present whenever military units embark from Guam. BTS is a nocturnal snake that will seek shelter during the day in any area that offers shade, including CONEX boxes, MILVANS, commercial shipping containers, crates, pallets, and personal gear, as well as aboard aircraft, ships, and wheeled or tracked vehicles. The snake can hide in extremely confined spaces. The BTS has the ability to go without food for extended periods and to survive long voyages or flights undetected. Military and commercial air- and sea-ports have recorded several instances of

a live BTS arriving from Guam. Therefore, BTS control and interdiction responsibilities have high priority.

A. BTS Control Measures at COMNAVMARIANAS and AAFB Cargo Points

WS personnel will provide support to the military on a routine basis as well as throughout any training exercises that involve the shipment of military personnel and associated cargo off-island via ship (Apra Harbor) and/or aircraft (Andersen AFB). This support is identified in Section II. D above. Ensuring that the BTS protocol is accomplished and that there are no delays in off-island shipment will require full cooperation from the units being inspected prior to embarkation.

Permanent Staging Areas. Permanent staging areas provided by COMNAVMARIANAS and 36th ABW for sea and air cargo are surrounded by chain link fencing with lighting. These areas are extensively patrolled for BTS but are **not** WS approved cargo staging areas. COMNAVMARIANAS uses Sierra Wharf and warehouse facilities at the former Fleet Industrial Supply Center (FISC). At AAFB, the primary staging area is the 634th Air Mobility Support Squadron (AMSS) warehouse (see Figure 1). Cargo is inspected at these sites daily. These facilities are primarily used for day-to-day cargo staging, but may be used for cargo related to a training exercise.

Temporary USDA-WS Approved Cargo Staging Area (WACSA). When needed to support an influx of training materials and equipment, WS will assist military personnel to select the site for a WACSA for cargo that will be embarked from Guam. In addition to establishing a WACSA at or near a permanent staging area, other paved areas could be suitable.

WACSA will be established when there will be a delay between BTS cargo inspection and movement to the loading point for aircraft or ship embarkation. The WACSA would be used to keep BTS from contaminating inspected cargo and to establish a controlled staging area for snake surveillance and trapping. The necessity to use a WACSA as part of the overall embarkation process will be reviewed during major exercise planning conferences so that the steps and additional time may be included in embarkation plans. The need to use either permanent staging areas or a WACSA at other paved surfaces with low potential for BTS presence will be determined during pre-deployment conferences with WS assistance.

The WS developed WACSA is a barrier constructed with angled sections of weather shade netting on re-bar and PVC pipe supports, weighted along the bottom edge with water snakes and sandbags. The number of entry and exit points is minimized and the barriers at the entrances are designed to lead any BTS toward a trap. The advantage of the temporary barrier is portability and a means to readily support fixed wing operations at main airfields, helicopter operations at landing zones, and ship offloads in port. A temporary snake barrier at AAFB Main or the FISC would be erected 3-5 days prior to the exercise. Snake traps will be placed on the fencing and/or along the forest perimeter. WS personnel will be responsible for trap and portable fence line maintenance, including trap cleaning and the care of mice used as an attractant.

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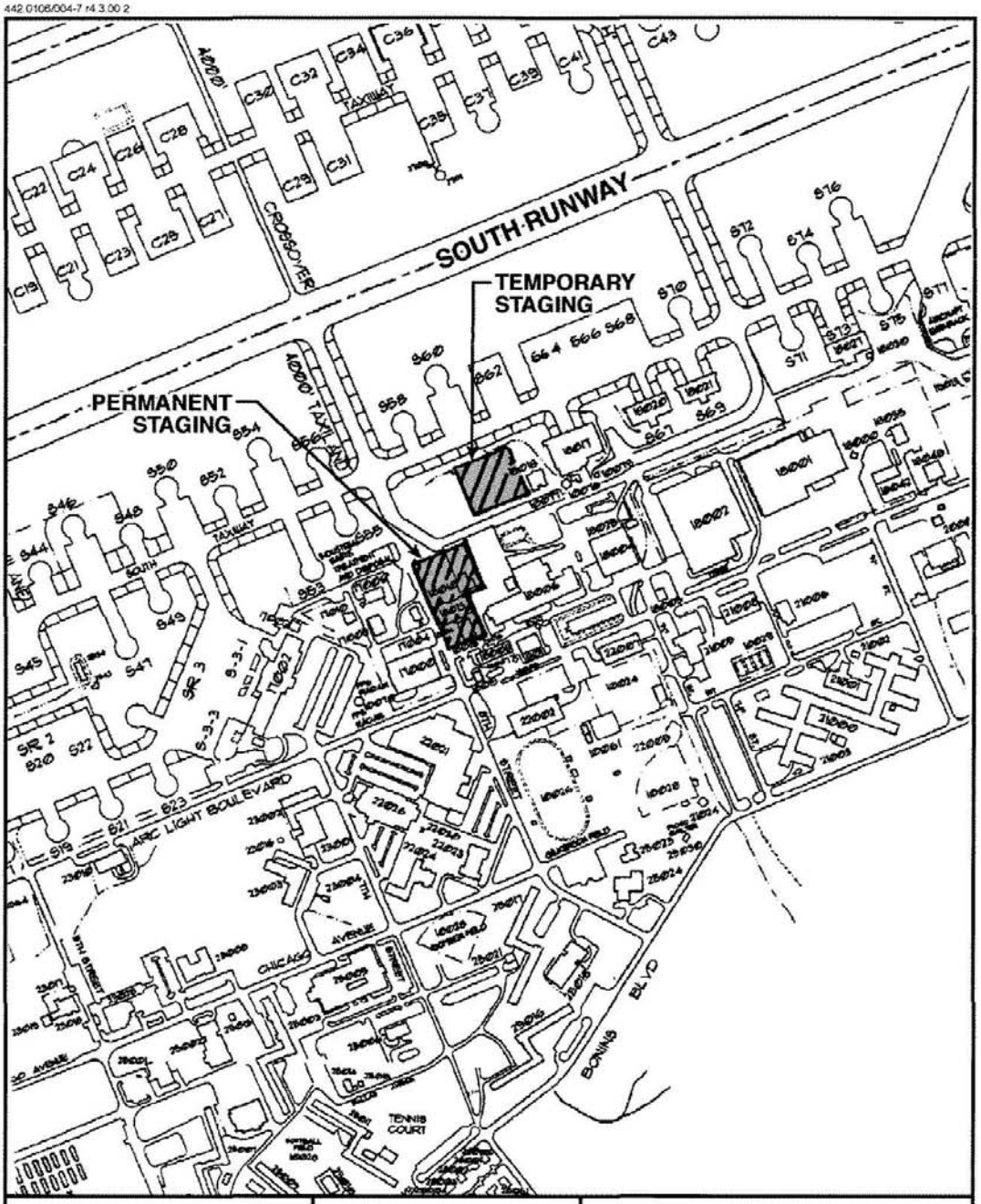

Figure 1
ANDERSEN AIR FORCE BASE
CARGO STAGING AREAS
BTS Control and Interdiction Plan
Belt Collins Hawaii, April 2000

Snake Trapping. Snake trapping is conducted prior to construction of the WACSA on Guam. The time necessary to initiate the effort depends on the selected WACSA site and the nature of the exercise. If the WACSA will be established at AAFB Main and the FISC, snake-trapping activities are already being conducted. If an area elsewhere on Guam, such as Northwest Field, Ordnance Annex, or Orote Point is going to be used, WS will initiate snake trapping thirty days prior to the exercise. Once the WACSA is erected, WS will conduct nightly spotlight searches in the area of the fence to augment area snake trapping.

Detector Dog Teams. WS will use snake detector dogs to inspect outbound cargo and aircraft. The snake detector dog teams (one team equals one dog and handler) will be made available as necessary 24-hours a day, seven days a week.

B. BTS Control Measures at COMNAVMARIANAS and AAFB Tent Cities

Site Selection. WS will be consulted to recommend areas of low BTS risk to be considered as Tent City (bivouac) sites.

Trapping and Searching. WS may elect to activate and monitor brown tree snake traps surrounding the immediate vicinity of tent cities. WS Detector dog teams will periodically walk through the area while troops are being staged prior to departure from Guam. Particular attention to BTS control measures is needed while breaking camp and re-packing tents and equipment susceptible to BTS infestation during bivouac and field training.

C. Cleaning Procedures

Responsibility. Prior to staging in a WACSA and embarkation aboard an aircraft or ship, each training unit will be responsible for cleaning its vehicles and equipment. For vehicles and equipment considered to be high-risk, additional procedures may be required such as high-pressure washing, steam-cleaning, fumigation, or other methods suggested by WS. These additional efforts will supplement any inspection conducted by cargo handlers, unit personnel and WS.

Cleaning Facilities and Equipment. AAFB and COMNAVMARIANAS will provide cleaning areas. If cleaning equipment is unavailable or if the exercise scenario would increase the risk of snake infestation of vehicles, the training units may be tasked with augmenting or providing all necessary cleaning equipment and supplies. To request installation support, training units may contact the following units:

For Andersen Air Force Base: Call Vehicle Operations at 366-2239, 24 hours, 7 days per week.

For COMNAVMARIANAS: Call the COMNAVMARIANAS Area Training Officer (Code N3) 339-6141.

D. Inspection Procedures on Guam

General. The inspection procedure is a joint military/WS effort. It includes individual user and cargo handler attention when packing materials for air and sea embarkation, and a subsequent thorough, systematic inspection of cargo, equipment, and vehicles by WS. To maintain open lines of communication among all involved, DOD will provide WS the names of military contacts at the shipping or air terminals, and WS will keep the military points-of-contact informed of their BTS inspection activities.

WS inspections are required for all outbound cargo. This includes inspections of equipment belonging to units stationed on Guam, and equipment that is transported to Guam by transient units from CONUS, Hawaii, or Japan for subsequent exercise support. Upon completion of the exercise, another inspection is required for equipment that will be cleaned, packed, and embarked for movement to home installations off-island.

Inspecting Personal Equipment. Military commanders are responsible for ensuring that all personal gear, hand-carried equipment and supplies, and tent canvas are visually inspected by military personnel as it is repacked when breaking camp. To facilitate the inspection, personal equipment and tent canvas will be laid out for WS detector dog inspection prior to palletizing or loading into shipping containers.

Inspecting Outbound Cargo. The decisions are based on the nature of the training exercise and volume of cargo to be transported from Guam to an off-island location. The objectives are to minimize the timeline necessary between cleaning and embarking equipment, and to minimize the use of a WACSA without degrading BTS control and interdiction protocols. The military commander and WS cooperate in making these decisions.

Inspecting Transports. The WS Detector Dog Teams may be tasked to inspect accessible transport craft (ship, barge, and/or airplane) prior to departure from Guam.

Inspecting Heavy Equipment and Vehicles. This equipment is often used to support field maneuvers prior to movement to the port of embarkation. WS Detector Dog Teams will inspect all heavy equipment and vehicles after they have been thoroughly cleaned.

Snake Detected or Suspected. If the detector dogs alert to a possible BTS on a vehicle, pallet, or at the threshold of a locked container, the suspected equipment will not be moved. A second detector dog team may be brought on-scene to confirm the first dog alerting to BTS presence. If the BTS is not discovered, the affected military unit will break out the cargo to allow BTS detection and elimination. If the BTS is not immediately found, WS will intensify its search and may activate additional traps in the vicinity of the affected shipment.

All outbound cargo is to be cleaned, inspected and immediately loaded onto a vessel or aircraft. If there is a delay between inspection and loading, cargo may be subject to WS reinspection or be placed in an approved WS cargo staging area. WS will decide on the proper course of action. WS may determine that any ship, barge, boat or aircraft that was inspected and then unattended may require another inspection prior to departure. Cargo, vehicles, and equipment held within a WACSA for an extended period (such as during the night when snakes are active) may be subject to additional inspection prior to loading for departure.

Schedule and Plan Modifications. WS plans its personnel and detector dog team assignments based on published exercise plans, arrival and departure schedules. Sites to be used as WACSA at ports of embarkation and debarkation are selected in advance and activated prior to the exercise commencing. Relocating established WACSA might not be feasible. However, given reasonable time to react, WS may alter its personnel and detector dog team schedules and assigned cargo and vehicle inspection sites. Since the BTS protocols take precedence when executing tactical troop and cargo movements from Guam, the arrival and departure schedules and points-of-contact will be verified by the military so that WS support will be on-hand when expected.

Inspection Verification Process for Tinian Shipments. WS personnel will identify inspected items within Guam containment areas by affixing a stamp and/or tag to cargo or cargo manifest denoting the words "Snake-Inspected" together with date and time the inspection occurred.

WS will be especially watchful to ensure that airdrop cargo for Tinian has been thoroughly inspected and is tagged for identification by CNMI Customs Inspectors.

E. Inspection Procedures on Tinian

Military exercises may involve personnel, cargo, and equipment movement between Guam and Tinian, CNMI. Similar staging and inspection processes for Tinian may be established at other island training sites.

1. Prior to a training exercise commencing on Tinian, WS personnel will identify, purchase, and make arrangements with DOD to transport BTS control and interdiction tools and equipment such as temporary snake barrier components, snake capturing equipment, and lighting. WS personnel will train volunteering wildlife and/or customs officials to assist with BTS interdiction measures

2. Supporting cargo that is shipped to Tinian from Guam in advance of the training exercise is subject to the routine cargo inspection process conducted daily by WS. A WACSA-type barrier may be used at the Tinian harbor, and the cargo will be checked by CNMI Quarantine Inspectors to ensure that BTS inspection was conducted on Guam and the stickers/tags then removed.

3. Prior to arrival of the first military cargo from Guam to Tinian, WS will review the BTS protocol and necessary actions with the on-scene federal and CNMI wildlife and/or quarantine officials. Exercise planning will include designating the following: responsible logistics personnel, cargo offloading and staging areas, and cargo drop zones to be used that will require BTS control measures. WS will conduct BTS surveillance during nighttime cargo offloading, staging, and release of inbound traffic from Guam. WS will coordinate spotlight searches of staging areas, fence lines, and any tree lines/forest areas in proximity to runways/taxiways that are designated as drop zones. These areas will be targeted during inbound and exiting traffic times.

4. The majority of personnel, cargo, and equipment that deploy from Guam to Tinian are air-transported to North Field (preferred) or the West Tinian Airport as part of the military exercise. Prior to arrival, sections of angled weather shading will be used to establish a containment area for offloaded personnel and cargo. The portable barrier will be erected and maintained about five days prior to the first shipment. Prior to the arrival of exercise personnel and cargo, snake traps with a mouse attractant, food and moisture source will be installed in the forest adjacent to the barrier. Snake traps inside the barrier will be a passive design.

5. WS will maintain the BTS traps at the containment area throughout the duration of the training exercise. Some traps will be installed near parachute drop zones and near take-off zones. Additional BTS traps shall be made available for contingency plans and in case BTS sightings occur in the exercise area.

6. An anti-coagulant toxicant (contained within a tamper proof bait box) will be used in and around brown tree snake trapping areas and near cargo containment/temporary snake barriers to reduce local rat populations. Removal of rats reduces the potential damage they inflict to traps and barrier material.

7. CNMI DLNR may provide Snake Detector Dog Teams from Saipan on short notice if BTS presence is suspected.

8. When shipments reach Tinian, CNMI Quarantine Inspectors may check for the BTS inspection stamp/tag that verifies that the inspection process was conducted on Guam. If there is no tag on cargo that originated in Guam, the cargo may be reloaded aboard the aircraft/ship and returned to Guam. The inspection stamp/tags will be removed prior to the cargo being moved out of the containment area or drop zone. It is important that the tags be removed to avoid any confusion when the equipment and vehicles are returned to Guam at the end of the exercise, and subsequently re-inspected prior to transient unit departures to home installations.

9. WS will maintain a log of all cargo, vehicle, equipment, and craft that are inspected and will monitor the time between inspection and movement. CNMI-DLNR staff may request copies of inspection logs and cargo manifests. WS and CNMI DLNR will continue to support inspection and surveillance at Tinian's air and sea ports of entry and exit until military forces have departed and the exercise is formally terminated.

VI. GUIDELINES FOR BTS SIGHTINGS

Emergency Response Procedures are published for COMNAVMARIANAS and Andersen Air Force Base to contact Guam WS immediately (see Table 1). Similar procedures have also been identified for publication at military bases in Hawaii, in case BTS are sighted or suspected in returning shipments. These procedures to obtain immediate support from Hawaii Department of Agriculture and WS are found in Enclosure (2).

A. Immediate Action

1. **Make every attempt to kill or to capture the snake**. Do not delay. The cost and difficulty of trying to locate an escaped BTS coupled with the potentially significant ecological impacts of

each snake justifies the killing or capturing of the snake immediately. If it is not possible to kill or capture the snake, maintain visual contact.

- A BTS can be captured by pinning it down with one's boot heel, a stick or rifle butt, or anything heavy. A sharp blow to the snake's head with the butt of a (unloaded) rifle or boot heel should be fatal.

- A bucket or heavy box can be used to capture a snake on a flat surface. Place the container over the head of the snake leaving enough space for the snake to crawl completely underneath the container. Then weight it down to confine the BTS. If bagging a stunned or pinned-down snake, grab it directly behind its head.

- Keep any dead or captured snake available for positive identification by WS or an Environmental Monitor.

2. **Exercise caution.** When threatened, a BTS will coil back into a strike position, flatten its head, and lunge to bite. Small grooved fangs located in the rear of the mouth enable the mild venom to trickle into the bite while the snake constricts. A normal defensive strike from a BTS will not allow the rear fangs to penetrate the skin and will usually result in minor punctures similar to pinpricks. When wearing battle dress uniforms (BDU) and field boots, a bite from a BTS will not penetrate clothing or footwear. Use caution with all snakes. There is the chance, although unlikely, that other, more dangerous, snakes could be encountered.

B. BTS Sighting on Tinian or Other CNMI Sites

Tinian is a BTS-free island, therefore, killing or capturing a sighted BTS is critical. Reaction to a BTS sighting on Tinian and subsequent incident reporting procedures are the same as described above for sightings on Guam. Staff response during major military training exercises on Tinian may include representatives of CNMI Division of Fish and Wildlife, WS, and/or Navy environmental monitor staffs. All are equipped with cellular phones. The latter will have radio/telephone communication with the CESG.

Exercise caution, safety and discretion. The priority action becomes killing, capturing, or containing the BTS. Report the incident, including the same information as needed for Guam BTS sightings.

The telephone numbers to call are:

CNMI Fish and Wildlife Saipan office:	(670) 664-6011/6000
CNMI Emergency Management Office:	(670) 322-9528/9
CNMI Fish and Wildlife Tinian office:	(670) 433-9298
USGS-RRT:	(671) 777-4477

USDA APHIS WS Guam District Office:	(671) 635-4400
USDA APHIS WS AAFB:	(671) 366-3822
USDA APHIS WS COMNAVMARIANAS	(671) 472-7101

CNMI will dispatch investigating personnel and detector dog team assistance. The WS and Navy Environmental Monitors/CESG will also be notified (via cellular phone numbers provided prior to the exercise).

C. Notifications for BTS Sightings on Guam

When a BTS is sighted, the immediate action is to kill or immobilize the snake so that it cannot escape. The person involved will then collect information of the incident that will describe the circumstances of the sighting, and remain on scene to act as primary POC to other responders. WS may call upon the person who discovered the snake to collect additional information.

1. When a BTS is sighted, killed and/or captured on Guam, or a BTS is suspected to be in a specific area, immediately contact the local area WS office, COMNAVMARIANAS and/or Commander. 36th ABW. The caller will provide the following information regarding BTS presence and will be given instructions regarding follow-on action:

- Caller:
- Military Organization:
- Sighting Location:
- Status: (Snake Killed/Captured/Contained/Loose)
- Date and Time of Sighting:
- Initial Response Action Underway at the Scene:

2. The telephone numbers to call during business hours are:

USDA APHIS WS Guam District Office:	(671) 635-4400
USDA APHIS WS AAFB:	(671) 366-3822
USDA APHIS WS COMNAVMARIANAS	(671) 472-7101

(WS is on call 24 hours per day, and WS field personnel are equipped with cellular telephones. The telephone numbers will be published prior to military exercises).

3. During major exercises, the unit and/or COMNAVMARIANAS will contact the CESG, who will alert exercise personnel needed to respond and the COMNAVMARIANAS Quarterdeck at (671) 339-7133. Cellular telephone numbers will be published prior to major exercises for contact with command Environmental Monitors in the field.

Once notified of a sighting and circumstances, WS will dispatch personnel and/or BTS Detector Dog Teams to the scene. Military personnel will cooperate fully with WS and their inspection of the area, and may provide any assistance needed to locate and capture a BTS.

D. Post-Training Exercise Snake Sighted in Hawaii

The Emergency Response Protocols established for snake sightings at Navy and Marine, Air Force, and Army installations on Oahu are attached as Enclosure (2). The principal state agency that must be informed is the Hawaii Department of Agriculture (HDOA), Plant Quarantine Branch at (808) 586-7378 or 586-PEST.

VII. REFERENCES

Brown Tree Snake Control Committee, Aquatic Nuisance Species Task Force. June 1996. *Brown Tree Snake Control Plan.*

Commander, Amphibious Group One Naval Message 040925Z December 1999, "USS Ogden and USS Rushmore Guam Equipment Washdown 7-13 Nov 99, Consolidated After Action Report of Lessons Learned."

Commander, U.S. Navy Marianas. October 1996. "Brown Tree Snake (BTS) Control/ Interdiction Plan for Military Training Exercises."

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United States Department of Agriculture. June 1996. *Environmental Assessment for Brown Tree Snake Control Activities on Guam.*

United States Department of Interior, Office of Insular Affairs. September 1999. *Integrated Pest Management Approaches to Preventing the Dispersal of the Brown Tree Snake and Controlling Snakes in Other Situations.*

United States Pacific Command. June 1999. Final Environmental Impact Statement, Military Training in the Mariana Islands.

HAWAII EMERGENCY RESPONSE PROTOCOLS

U.S. NAVY

SNAKE SIGHTED ON NAVY PROPERTY

Kill or Immobilize the Snake

Maintain Visual Contact

If Sighting is in or around the Pearl Harbor Naval Complex

Navy Housing, Naval Station, Pearl Harbor Naval Shipyard, Fleet Industrial Supply Center, Naval Intermediate Maintenance Facility, Public Works Center

COMPACFLT, PACDIV, Inactive Ships, and all Navy Commands in the Area:

CALL NAVAL STATION SECURITY POLICE at

471-7114

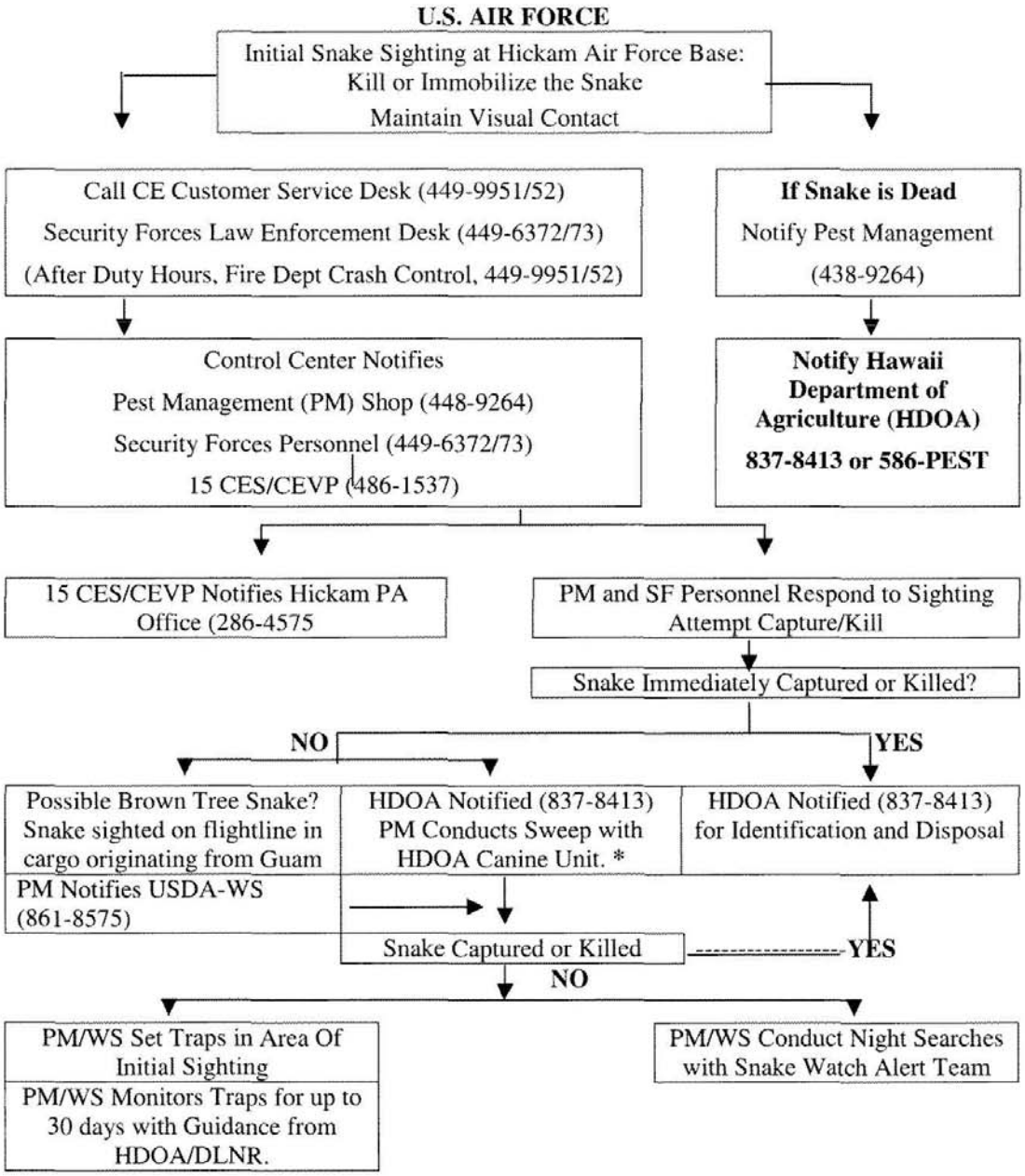
If Sighting is outside the Pearl Harbor Naval Complex

CALL SECURITY POLICE IN THAT AREA

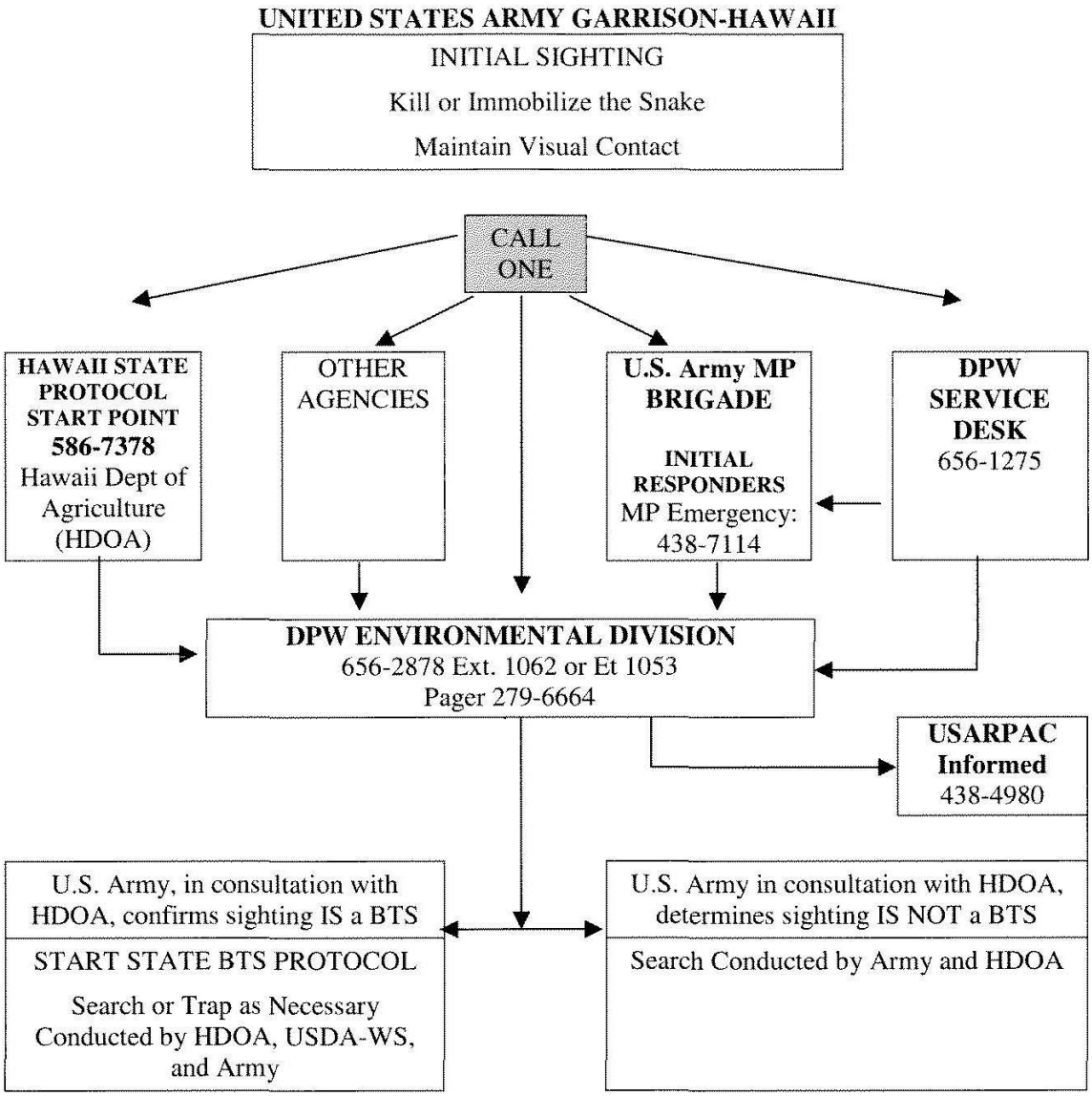
Pacific Missile Range Facility, Kauai	Naval Magazine, Lualualei	Naval Computer and Telecommunications Master Station	Naval Security Group Activity, Kunia
471-6523	668-7114	653-0000	655-3200
471-4185	471-5141	653-0234	655-3205

Area Security Police will provide first response to sighting and inform NAVSTA dispatch at 71-7114 and the Department of Agriculture at 586-7378. First responders will collect information on the snake sighting, if it was killed or captured, and act as the primary POC to others responding to the scene. Security Police are trained in snake response equipment and techniques.

All civilian and military personnel will be briefed on BTS and trained to respond and comply with reporting procedures. The videotape "The Silent Invader" will be shown as part of this training. Training should be recurring. BTS posters will be displayed in buildings to remind personnel of the danger. The reporting number should be changed to the number for that area. For more information, contact the COMNAVBASE Pearl Harbor Regional Conservation Coordinator, at 471-0326, or Environmental Protection Specialist at 471-1171, extension 233. Alternate number is 471-1171, extension 225 (pager number 361-4864).

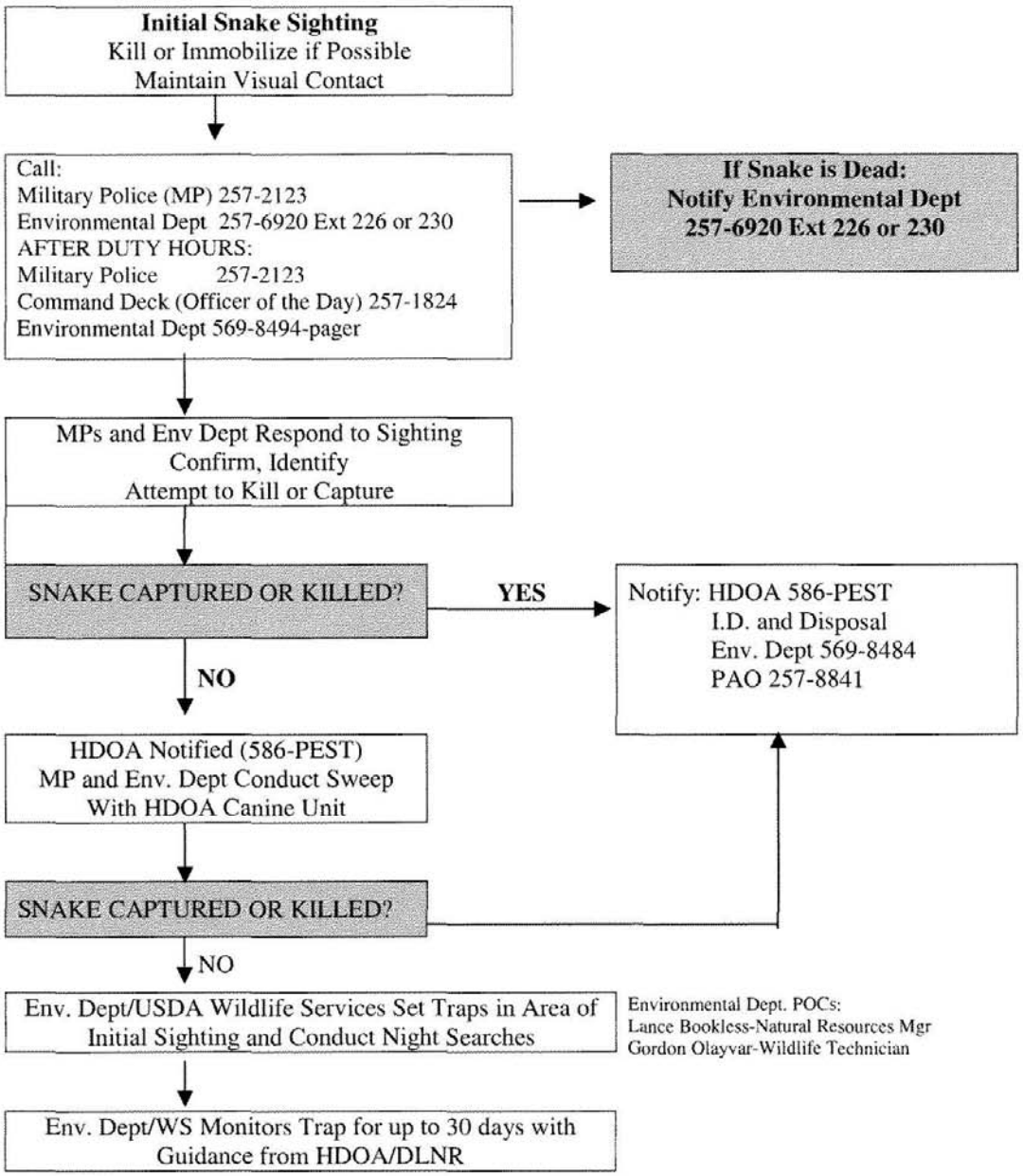


Notify J431, USCOMPAC at 477-0850 if State and WS activate Emergency Response Team.



If State and WS Emergency Response Team are dispatched to military installations, notify J421, USCOMPAC at 477-0850.

MARINE CORPS BASE HAWAII, KANEOHE BAY



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:
2010-F-0122
2014-F-0025

Received via email
October 31, 2014

Mr. Joseph Ludovici
Joint Guam Program Office
Department of the Navy
Office of the Assistant Secretary
1000 Navy Pentagon
Washington, D.C. 20350-1000

Subject: Reinitiation of Formal Consultation regarding the Joint Guam Program Office (JGPO) Relocation of the U.S. Marine Corps (USMC) from Okinawa to Guam and Associated Activities on Guam and Tinian

Dear Mr. Ludovici:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) receipt of your September 30, 2014, letter and Biological Assessment (BA) for the subject action on October 1, 2014. We appreciated the opportunity to meet with your staff to discuss the BA on September 16, 2014, and gratefully acknowledge the continued coordination between our offices since then. However, for the reasons discussed below, based on our review of the BA, we have determined that additional information is still necessary for us to initiate and complete this consultation. We request the following information or clarifications:

Information Needs Related to Specific Components of the Proposed Action

Live-Fire Training Range Complex (LFTRC). The following information is needed to analyze the potential effects of noise and light on the Mariana fruit bat and nesting sea turtles at Ritidian Point, and on the capability of critical habitat within the surface danger zone to support the recovery of the Mariana fruit bat, Guam Micronesian kingfisher, and the Mariana crow once these species are reintroduced: the term and timing of range activities, the types of equipment used, the number and type of ammunition used, noise levels (including peak levels) caused by specific construction activities and the operation of the firing range, and any information on the use of lighting (e.g., location, color, intensity, and frequency).

Serianthes Tree (*Serianthes nelsonii*). The following information is needed to analyze project-related effects to the *Serianthes* tree as result of the construction and operation of the LFTRC,

specifically: (1) What is the extent of the proposed fire break/fuel break in the immediate area surrounding the tree? Please provide us with a copy of the SOP on fire control (as referenced on page 22 of the BA); (2) What vegetation would be cleared west, east, and south of the tree for the firing range? Because the vegetation surrounding the tree acts as a buffer from strong winds, especially during a typhoon event, we are concerned that a 100-foot buffer may not be adequate to protect the tree from these impacts. Please provide the analysis that was conducted to determine that the 100-ft buffer is adequate to protect the tree from strong winds. Please clarify whether the 100-foot buffer would apply to the entire area surrounding the tree, or to one or two sides; and (3) The *Serianthes* tree is the only (reproducing) adult of this species on Guam. Therefore, access to and collection of *Serianthes* seeds and seedlings are important for the recovery of this species. How will the operation of the firing range affect access to the tree's seeds and seedlings? Is the microclimate around the area occupied by the tree likely to change as a result of the proposed action?

Sea Turtles. As discussed during our meeting on September 16, 2014, military personnel will walk the beach to ensure that no person is within the safety danger zone before the firing range becomes active. Nesting sea turtles use the beach at the GNWR and may be affected by military personnel conducting these safety checks. Human presence and the use of artificial lighting on the nesting beach may cause female turtles to stop nesting and return to the ocean. Other impacts may include inadvertently trampling of nests and hatchling sea turtles, and disorientation of hatchling sea turtles if artificial light is used on or near the beach. Measures should be implemented to avoid these adverse effects to sea turtles as a result of disturbance from personnel, especially at night or sunset. We request information on the frequency and timing of this activity, and the measures that will be taken to avoid and minimize adverse impacts to sea turtles, such that those impacts are insignificant or discountable. In the absence of this information, we are unable to concur with your determination of "not likely to adversely affect" for the green sea turtle (*Chelonia mydas*) and the hawksbill sea turtle (*Eretmochelys imbricata*).

Mariana Common Moorhen. The BA states that the proposed action would not affect the moorhen. However, the proposed road and bridge work and the training over and within the south portion of Naval Munitions Site in the BA are very similar to that considered in the Service's 2010 Biological Opinion on the Joint Guam Program Office Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam and Tinian (JGPO BiOp). In that BiOp, we determined these actions were likely to adversely affect, but not jeopardize the continued existence of the Mariana common moorhen. If the proposed actions are comparable, please provide the analysis or clarification supporting your "no effect" determination. If the actions are not comparable, please explain how they differ. Please note that the JGPO BiOp included measures such as (1) road and bridge work will be designed so that permanent impacts that would make habitat unsuitable for recovery of moorhen do not occur up or down stream and (2) the DoN is committed to designing project-related retention ponds and stormwater collection areas associated with the proposed project to ensure these water-bodies do not attract moorhen.

Quarry Sites. The BA states that native material excavated on-site may be suitable for reuse as fill material for construction. If material on-site is not useable, would quarry material from other sites on Guam or Hawaii be used for construction? If so, we request information on the locations

of additional quarry sites and an analysis on whether listed species and critical habitat are likely to be impacted at these sites.

GIS Layers and Shapefiles. We request the DoN to provide the Service with the GIS layers and shapefiles for the project construction and training activity areas. This will help us verify the specific amount of acres of habitat for listed species that would be lost or unavailable as a result of the proposed action.

Clarificationof the Relationship between the Proposed Action and the Previously Proposed JGPO Action

In the BA, we noted that the language, and thus possibly the content, on the following topics differs from that in the JGPO BiOp. For purposes of analysis and consultation efficiency, we request your assistance in helping us understand where these proposed project components are the same as and where they may differ from what was described in the JGPO BiOp. If possible, the use of language common to the earlier consultation process would facilitate our analysis in this consultation.

Reintroduction of Native Endangered or Threatened Species to Department of Defense (DoD) Lands on Guam. Please confirm that the DoN continues to support the following language agreed to in the proposed action for the JGPO BiOp:

> "The DoN conservation measures are intended to support re-introduction of native endangered or threatened species on DoD lands on Guam consistent with species recovery plans. In further support of such recovery efforts, the DoN intends to actively participate in recovery committees for endangered or threatened species on Guam. When the DoN and Service mutually agree the constraints to reintroduction of native threatened or endangered species on DoD lands on Guam have been minimized to a point that a feasible and successful re-introduction of the affected species is more probable than not, the DoN will work with the Service to develop a re-introduction plan and supporting programmatic biological opinion that ensures such re-introduction efforts are consistent with the species recovery plans and the military mission on Guam."

The BA appears to revise the roles of the DoN and the Service discussed in the JGPO BiOp relative to the reintroduction of listed species. Please clarify any changes in those roles and responsibilities under the proposed action.

Brown Treesnake Interdiction. Please confirm that the DoN continues to support the following language agreed to in the proposed action for the JGPO BiOp:

> "DoN agrees that it will fund the increase of current federally funded brown treesnake interdiction measures (in Guam, CNMI, and Hawaii) where the increase is related to direct, indirect and induced-growth caused by the Marine Corps relocation to Guam. That funding will continue and become part of the DoN's current brown treesnake interdiction funding under authority of the Brown Tree Snake Control and Eradication Act. The DoI agrees that it is not DoN's responsibility to fund increased interdiction measures that are identified more than one year after the end of the fiscal year in which

> both Marine Corps relocation construction undertaken to implement the proposed relocation decisions made in the Record of Decision (ROD) for the "Environmental Impact Statement/Overseas Environmental Impact Statement for Guam and CNMI Military Relocation: Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force" has ended and the permanent nontransient Marine Corps military units relocated as a result of decisions made in that ROD have concluded their relocation to Guam. For the purposes of this Project Description, interdiction is defined as: "to hinder, prohibit, or prevent the brown treesnake from becoming established in new locations by conducting inspection and suppression processes."

The discussion of this topic in the BA appears to be different from the above statement relative to the DoN obligation to fund increased interdiction measures one year after the end of the fiscal year in which both the USMC relocation construction has ended and the permanent, non-transient USMC military units have relocated to Guam. It is the Service's understanding that DoN would continue to provide a baseline level of interdiction funding related to the direct, indirect and induced-growth effects of its proposed action beyond this one-year timeframe. It is also the Service's understanding that this baseline would be identified prior to the one year after the end of the fiscal year in which both the USMC relocation construction has ended and the permanent non-transient USMC military units have relocated to Guam. If the DoN is not committing to fund adequate interdiction for the term of these effects, there remains a possibility that brown treesnakes may be introduced to areas outside of the current action area as a result of this proposed action. If this is the case, the action area for this proposed action is significantly greater than the island of Guam, and we therefore request the DoN to revise the action area to incorporate the potential transport pathways to and from Guam (e.g., CNMI, Hawaii, California), and analyze impacts to threatened and endangered species that may be exposed to the brown treesnake within the revised action area as a result of the proposed action.

Biosecurity. The BA provides adequate detail relative to a sub-set of proposed activities related to biosecurity (e.g., Hazard Assessment and Critical Control Point planning and implementation). However, the proposed action in the JGPO BiOp provided greater detail on proposed biosecurity measures for both the civilian and military sectors. The Service will need a comparable level of detail to assess the adequacy of biosecurity measures relative to the direct, indirect and induced-growth effects associated with the proposed action. Given the biosecurity measures proposed in the BA are different from those proposed in the JGPO action that was analyzed in the JGPO BiOp, please provide further clarification and information relative to the biosecurity measures in the BA so that we can complete our analysis.

As you know, Service Regional Office and Headquarters staff are currently working with your staff on a programmatic approach for implementation of biosecurity measures at a regional scale. Once that effort is finalized, our expectation is the DoN will adopt appropriate measures as an amendment to the currently proposed JGPO action and request reinitiation of formal consultation, as appropriate.

Information Needs Regarding Interdependent and Interrelated Actions

The analysis of the effects of the action in the BA is incomplete in that it does not assess the effects of other activities that are interrelated to, or interdependent with, the proposed action. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. Consideration of the effects of such activities is inherent in the regulatory definition of "effects of the action" at 50 CFR 402.02.

For example, the proposed action in the JGPO BiOp included construction and use of training ranges on Tinian that would be used by Marines relocated to Guam. The training ranges on Tinian are still proposed for construction; however, the BA did not assess the impacts of these interrelated activities. Please provide this analysis, or clarify why the proposed training ranges on Tinian are not an interrelated activity. Similarly, the proposed Army missile defense weapon system located at Northwest Field (NWF) on Andersen Air Force Base was previously included in the JGPO BA addressed in the Service's JGPO BiOp. This activity has been removed from the current BA and a different Army missile defense system, THAAD, has been proposed for placement at NWF. We understand that the DoN and Army will request a separate consultation for this action. However, it appears this missile defense weapon is also interrelated to the current proposed action. Therefore, an analysis of its effects on listed species and critical habitat should be included in this BA. Please provide this analysis or explain how the proposed THAAD is not an interrelated activity. We want to ensure that actions that may be interrelated or interdependent or otherwise part of the proposed action are appropriately analyzed pursuant to the requirements of the implementing regulations for section 7.

Information Needs Regarding Cumulative Effects

Please provide further clarification and analysis regarding cumulative effects from the actions identified in the current BA. This analysis needs to be part of the BA verses a reference to the JGPO SEIS that is currently under review. A cumulative effects analysis conducted under NEPA is different and separate from that conducted under section 7 of the ESA. The Service recognizes that the DoN has provided an analysis of cumulative effects of non-Federal activities that are reasonably certain to occur within the action area within the current BA. We request that the DoN provide a more robust analysis of cumulative effects that addresses: civilian development and wildfire impacts on federally-listed species and their habitat needed for recovery; biosecurity and transport of cargo through Guam's ports and airport/anticipated port and airport ship and airplane use, respectively. The JGPO BiOp (see pages 182-187) provides a template for this information.

Development of a Comprehensive Conservation Strategy for Guam and the CNMI

This letter focuses on your request to reinitiate formal consultation on JGPO. As you may know, there is an on-going joint effort between the FWS and DoN to develop a comprehensive conservation strategy to address the agencies mutual need in the Pacific. We understand that the broader conservation strategy will be designed to provide conservation for imperiled species and their habitat not just in the JGPO action area, but also in the areas of all DoN current and future actions to be proposed on Guam and in the CNMI. When that jointly-developed conservation

strategy is formalized, we anticipate that DoN may seek to implement it, likely influencing the actions you are currently considering in this reinitiated consultation. Consequently, we recognize that should the DoN chose to implement this broader conservation strategy, it may need to be addressed through a future section 7 process and depending on timing, may necessitate amendment of the proposed JGPO action and/or BA as well. The Service sees the value in developing a conservation strategy and would seek to address any changes in the Section 7 process that would be required to incorporate identified conservation actions in a timely manner.

This concludes our comments on the BA for the subject action. Once we receive all of the information requested above, or receive a statement explaining why that information cannot be provided, formal consultation on the proposed action will be initiated. We will notify you when we receive this additional information; our notification letter will also outline the dates within which the formal consultation should be completed.

Please note that during formal consultation, section 7(d) of the ESA requires the Federal action agency to avoid making any irreversible or irretrievable commitment of resources that may preclude the development or implementation of reasonable and prudent alternatives to avoid jeopardy or adverse modification of critical habitat, as appropriate.

We appreciate the opportunity to assist you with the proposed project. If you have any questions, please contact Kristi Young, Deputy Field Supervisor of the Pacific Islands Fish and Wildlife Office, at (808) 792-9400 or kristi_young@fws.gov.

Sincerely,

Douglas Krofta
Acting Field Supervisor

DEPARTMENT OF THE NAVY

OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS & ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350 - 1000

November 7, 2014

Mr. Douglas Krofta
Acting, Field Supervisor, Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
Department of the Interior
300 Ala Moana Boulevard, Room 3-122 Box 50088
Honolulu, Hawaii 96850

SUBJECT: REINITIATION OF FORMAL CONSULTATION REGARDING THE PROPOSED MILITARY RELOCATION TO GUAM (SERVICE FILE NO. 2014-F-0025)

Dear Mr. Krofta,

Thank you for your letter acknowledging receipt of our September 30, 2014 letter and Biological Assessment for the subject action. Enclosure (1) provides the additional information you requested. I look forward to your notification letter confirming initiation of formal consultation and outlining the dates within which formal consultation will be completed.

My team is ready to work with yours throughout this consultation in a positive and deliberate manner in accordance with Section 7 of the Endangered Species Act. Given the international implications underlying the subject action, it is crucial that our collaborative effort produce a Biological Opinion that will support the Navy's issuance of a Record of Decision by early next spring. With the holiday season fast approaching, I request our first formal consultation meeting no later than two weeks from your receipt of this letter, and completion of the formal consultation within the prescribed 135 days. I also request the opportunity for a seven-day review of the draft version of the Biological Opinion.

The DON's technical point of contact on this matter is Ms. Coralie Cobb, Naval Facilities Engineering Command, Southwest, at (720) 542-3085 or coralie.cobb@navy.mil. If you have any questions regarding this request please contact Mr. Randel Sablan, JGPO Environmental Director, at (671) 339-5440 or randel.sablan@navy.mil.

Sincerely,

J. A. CAMPBELL
By direction

Enclosure: 1. Additional Information in Support of the Biological Assessment for the Reinitiation of Consultation for the Proposed Military Relocation to Guam

SUBJECT: REINITIATION OF FORMAL CONSULTATION REGARDING THE PROPOSED MILITARY RELOCATION TO GUAM (SERVICE FILE NO. 2014-F-0025)

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Headquarters, U.S. Fish and Wildlife Department (Mr. Dan Ashe)
Pacific Regional Office, U.S. Fish and Wildlife Department (Ms. Robyn Thorson)

Department of Navy Response to Fish and Wildlife Service Request for More Information within the Biological Assessment for the Proposed Military Relocation to Guam
November 7, 2014

The following information below is provided in response to the Fish and Wildlife Service's (FWS) October 31, 2014 letter requesting additional information necessary to initiate formal consultation on the potential impacts to listed species from the proposed military relocation to Guam. This document serves as an addendum to the biological assessment (BA).

Information Needs Related to Specific Components of the Proposed Action

1. **Live-Fire Training Range Complex (LFTRC).** The best available information on the term and timing of range activities, the types of equipment used, the number and type of ammunition used, noise levels caused by specific construction activities and the operation of the firing range, and any information on the use of lighting is available in 2014 Draft SEIS, Chapter 2 – Proposed Action and Alternatives Purpose of and Need for the Proposed Action specifically, 2.2.3 Live-Fire Training Range Complex. Section 2.2.3 is included at the end of this enclosure.

   There is no noise modelling tool that can predict the peak noise at the LFTRC, especially prior to construction. Topography, cloud cover, wind direction, etc. all greatly affect noise propagation. Mr. Joe Schwagerl, Manager GNWR, informed DON in his February 13, 2014 FWS letter that conducting a sound propagation study was not an appropriate use of the GNWR therefore the analysis in the BA and the SEIS is based upon the best available data. As requested in your letter, we are informing you that the information on peak noise is unavailable.

   DON's analysis on critical habitat was based on the October 28, 2004 Federal Register designating critical habitat for the Mariana fruit bat, Guam Micronesian kingfisher and the Mariana crow on Guam. In the Federal Register, the FWS addressed a comment on the adverse impacts of jet noise on fruit bats and birds. The FWS concluded that the presence of auditory or visual human disturbances does not affect the presence of the primary constituent elements used to define critical habitat. Based on this information, we concluded a "may affect, not likely to adversely affect" on the capability of critical habitat within the surface danger zone to support the recovery of the Mariana fruit bat, Guam Micronesian kingfisher, and the Mariana crow.

2. ***Serianthes* Tree *(Serianthes nelsonii).*** (a) As stated on page 21 of the BA, "Fire management is a key component of range management. The DON goal is to reduce the impact of fires by limiting their frequency, size, and severity while still allowing the USMC to maintain a high level of combat readiness. The range management plan will include the following elements of fire management:…" The fire management plan has not been drafted but will be prepared prior to conducting operations on the range. The elements listed under fire management were obtained from the Biological Opinion on Routine Military Training and Transformation of the 2nd Brigade 25th Infantry Division (Light), U.S. Army Installations on the Island of Hawaii (1-2-2003-F-02) that was provided to us by your office in response to your concern regarding fire management.

(b) The focus in the BA is on recovery habitat as per the 2010 BO. However, the SEIS identifies the direct impacts to vegetation communities with the implementation of LFTRC in Table 5.5.8-2.

	Vegetation Community (acres [ha])				
Project Component	*PLF*	*SLF*	*HS*	*Dev*	*Total*
Range Areas & Associated Features	90.5 [36.6]	91.3 [36.9]	42.1 [17.0]	30.6 [12.4]	254.5 [103.0]
HG Range (at Andersen South)	0	19.4 [7.9]	1.8 [0.7]	1.8 [0.7]	23.0 [9.3]
Total	**90.5 [36.6]**	**110.7 [44.8]**	**43.9 [18.8]**	**32.4 [13.1]**	**277.5 [112.3]**

Legend: PLF = primary limestone forest; SLF = secondary limestone forest; HS = herbaceous scrub; Dev = developed.

As stated on page 77 of the BA, the analysis on the 100 foot buffer was based on current literature regarding the protection of trees from construction activities which recommends a protective buffer based on the diameter at breast height (dbh) of the subject tree (Oregon State University 2009; University of Hawaii 2010; Johnson 2013). The 100 foot buffer is approximately three times that which is recommended by the literature.

The analysis is related to the "critical root radius" approach which is calculated by measuring the dbh in inches. For each inch of dbh, there is to be 1.5 ft (0.5 m) of critical root radius for sensitive, older, or unhealthy trees, or 1 ft (0.3 m) for tolerant, younger, healthy trees to ensure protection of the root zone. Therefore, based on the current dbh of 22.4 in (57 cm) for the subject *Serianthes* at NWF, the buffer would be 33.6 ft. To avoid any impacts to this tree, a minimum buffer of 100 ft (30 m) would be established around the tree and no activities would be permitted within this buffer. Therefore, since DON is proposing a buffer approximately three times that which is recommended based on the best available information, there would be no impacts to the *Serianthes* tree with implementation of the proposed construction activities associated with the Proposed Action.

Oregon State University. 2009. Tree Protection on Construction and Development Sites: A Best Management Practices Guidebook for the Pacific Northwest. EM 8994. Extension Service. December.

University of Hawaii - Manoa. 2010. University of Hawaii Campus Tree Care Plan. http://manoa.hawaii.edu/landscaping/landscapingpage/ongoing.php.

Johnson, G.R. 2013. Protecting Trees from Construction Damage: A Homeowner's Guide. Urban and Community Forestry, University of Minnesota Extension Service.

As depicted in SEIS, Figure 5.5.8-1 - Vegetation Communities and Plant SOGCN Observations - NWF LFTRC Alternative of the DSEIS, the 100 foot buffer is applicable to the north, east and southern sides of the tree. The vegetation on the west side of the tree will not be affected by the Proposed Action.

(c) As stated on page 40 of the BA, DON has included *S. nelsonii* in the list of species to be considered for propagation, planting, and establishment as part of the forest enhancement so access to and collection of *Serianthes* seeds and seedlings for use in forest enhancement activities will be allowed. Coordination with the range manager will be required before entering the range complex for collection of the seeds. The microclimate around the area occupied by the tree is not likely to change as a result of the Proposed Action as we are planning for a 100 foot buffer around the tree, approximately three times the recommended buffer based on the best available scientific information. Also, as stated on page 58 of the BA, in 2012, Joint Region Marianas (JRM) funded a study by University of Guam (UoG) to monitor the mature seed bearing tree. The study indicated the tree is leaning much more in recent years, which renders it more susceptible to snapping or toppling in the event of a catastrophic typhoon. Mealy bug infestations were routinely evident upon inspection of leaf litterfall. *Eurema* adult butterflies were persistently observed within the canopy (U.S. Navy 2014). The UoG study monitored seedling emergence and growth beneath the mature *S. nelsonii* tree. Of the 488 seedlings that emerged and died during the course of the project, only four seedlings exhibited lifespan greater than 200 days. Past reports have indicated deer browsing was the major cause of *in situ* seedling death. Strict maintenance of the functional exclusion fence was sustained throughout the study, so deer or pig damage could not have been responsible for the mortality of the 488 seedlings that emerged and died during the study. Also, there was no seasonal pattern that could explain the extraordinary lifespan of these four seedlings. This study indicates that the health of the tree is already substandard and our actions to brace the tree and propagate, plant, and establish this species as part of the forest enhancement will provide a greater benefit to the species in the future than is being done for it today.

3. **Sea Turtles.** No live-fire training, or any training, is proposed to occur on the beaches of the Ritidian Unit of the Guam National Wildlife Refuge.

   One or two Range Safety Specialists would patrol that portion of the Ritidian Unit within the proposed surface danger zone before a firing range becomes active to ensure no persons are present. Only the areas that cannot be "seen" by the surface radar will need to be physically cleared prior to live-fire. Once the area has been cleared, the surface danger zone that extends over the water will be monitored by the Range Safety Specialists eliminating the need to have personnel walking the beach. Patrols are conducted on foot similar to FWS patrols and surveys, and will be less frequent than FWS patrols. As stated on page 43 of the BA, the DON, in cooperation with DAWR, has undertaken an educational program to inform newly reporting military and DoD civilian personnel about sea turtle nesting and the potential impacts to the species from nest disturbance, direct harassment of sea turtles (in the marine and terrestrial environment), beach disturbance, and other threats. Range Safety Specialists conducting foot patrols along the beaches of the Ritidian Unit will be required to complete the education program, with added emphasis on sea turtle nesting activity and hatchling behavior awareness. Therefore, we believe the not likely to adversely affect determination is appropriate.

   As stated in the Best Management Practices section of the BA, lighting will be designed to meet minimum safety, sustainability, antiterrorism, and force protection requirements. Hooded lights will be used to the maximum extent practicable at all new roads and facilities within sea turtle land habitat and fruit bat roost areas. "Night-adapted" lights will be installed in the briefing and bleacher areas at NWF and Andy South. Illumination of forest, coastline or beach will be kept to an absolute minimum.

   As stated in Section 2.2.4 of the BA, range utilization would depend on the number of personnel required to complete annual individual training events, the duration of each event, and the

training capacity of each range. Proposed live-fire operations at the LFTRC are not continuous and would occur between 7:00 a.m. and 7:00 p.m. for up to 39 weeks per year, and night operations (estimated to occur 2 nights per week over 39 weeks per year) would occur between 7:00 p.m. and 10:00 p.m. or 6:00 a.m. and 7:00 a.m.

4. **Mariana Common Moorhen.** The current Proposed Action is not comparable to the 2010 BO. The adverse impacts to the Mariana common moorhen addressed in the 2010 Biological Opinion on the Joint Guam Program Office Relocation of the U.S. Marine Corps from Okinawa to Guam and Associated Activities on Guam and Tinian (JGPO BO) were a result of the actions on Tinian. The 2010 BO anticipated incidental take may occur to the Mariana common moorhen as a result of the Proposed Action. As stated in the BA, the incidental take statement was for four Mariana common moorhens that may be incidentally taken in the form of harassment on days when construction and live-fire exercises occur at the proposed ***Tinian*** firing ranges. As stated on pages ES-1, 1, 7, 31 and 45 in the BA, four ranges and associated infrastructure on Tinian are not included as part of the Proposed Action and have an independent disposition from the USMC relocation.

   Our "no effect" determination is based on the 2010 BO Effects of the Action - Mariana common moorhen. The BO identified the cause of the potential impacts to the species as the spread of invasive species, ungulates, brown treesnake (BTS), construction and live-fire training at the Tinian range. As addressed in the 2010 BO, the proposed road and bridge work on Guam did not have impacts to Mariana common moorhen as moorhens are not known to occur in the area. However, the DON indicated it would postpone clearing and construction if nesting Mariana common moorhen were discovered to be present. The training activities within Naval Munitions Site (NMS) are not anticipated to have impacts to the Mariana common moorhen. However, DON proposed to avoid bird strike and noise impacts to Mariana common moorhen by adjusting aviation training. All aviation training will be conducted so that flights will approach the southern portion of the NMS over the Talafofo River watershed and Fena Reservoir at heights of 1,000 ft (305 m) or greater above ground level. Flights may go up the Ugum River at altitudes of 1,000 ft (305 m) or greater above ground level until they reach 9,843 ft (3,000 m) from the mouth of the river at Highway 4 and then flights may conduct low level terrain flights. This is consistent with the Mariana Islands Range Complex BO.

5. **Quarry Sites.** As stated on page 13 of the BA, contractors are 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 certificate, and certificate of origin. Treatment (disinfection) must be conducted at the point of origin. We cannot identify the need or the potential source of any off island material at this time. However, we do require contractors to obtain materials from permitted facilities. If our response does not address your concerns, during our consultation, please provide further clarification and information relative to the quarries so that we can resolve this issue. If our response does not address your concerns, let's discuss during our consultation and resolve the issue.

6. **GIS Layers and Shapefiles**. We can assemble the GIS layers and shapefiles and provide them to you during our formal consultation meeting so you can double check our data and verify the specific amount of acres of recovery habitat for listed species that would be lost or unavailable as a result of the Proposed Action.

Clarification of the Relationship between the Proposed Action and the Previously Proposed JGPO Action

1. **Reintroduction of Native Endangered or Threatened Species to Department of Defense (DoD) Lands on Guam**. As we discussed with your staff on May 23, 2014 and September 16, 2014, this text was virtually verbatim from the 2010 Biological Opinion with the exception of some minor grammatical edits to confirm with wording of the BA. We specifically mentioned that the content of the language was unchanged but offered the opportunity to discuss any concerns with the text if your office felt the meaning was altered, as that was not our intent. We have analyzed the language and found the following differences:

    a. In the 2010 BO the term "DoN" is used and in the 2014 BA we used "DON" as the acronym for Department of the Navy. The acronym was defined in its first use in the 2014 BA as well as in the list of Acronyms and Abbreviations in the BA.
    b. In the 2010 BO the term "Service" is used and in the 2014 BA we used "USFWS" as the acronym for the U.S. Fish and Wildlife Service. The acronym was defined in its first use in the 2014 BA as well as in the list of Acronyms and Abbreviations in the BA.
    c. In the 2010 BO we used "re-introduction" and in the 2014 BA we used "reintroduction."
    d. In the 2010 BO we used "biological opinion" and in the 2014 BA we used acronym "BO." The acronym was defined in its first use in the 2014 BA as well as in the list of Acronyms and Abbreviations in the BA.

    Editorial changes to the language in the BA simply use established acronyms in lieu of formal titles and correct grammar and formatting. The language does not contain substantive edits and the commitment of the DON remains unchanged.

2. **Brown Treesnake Interdiction.** As we discussed with your staff on May 23, 2014 and September 16, 2014, the text is virtually verbatim from the 2010 Biological Opinion with the exception of some minor grammar edits. We specifically mentioned that the content of the language was unchanged and offered the opportunity to discuss any concerns with the text if your office felt the meaning was altered, as that was not our intent. We have analyzed the language and found the following differences:

    a. The language you provided in your letter was from page 18 of the 2010 BO. The language in the 2014 BA incorporates that text as well as the text on page 75 of the 2010 BO, which includes specifics on funding and transportation levels.
    b. In the 2010 BO the language begins with ""DoN agrees that it will fund the" and the 2014 BA we used "In addition, as stated in the 2010 BO, the DON will fund any."
    c. In the 2010 BO the term "brown treesnake" is used and in the 2014 BA we used the acronym "BTS" as the acronym for the brown treesnake. The acronym was defined in its first use in the BA as well as in the list of Acronyms and Abbreviations in the BA.
    d. In the 2010 BO we used "induced-growth" and in the 2014 BA we used "induced growth."
    e. In the 2010 BO the term "Marine Corps" is used and in the 2014 BA we used the acronym "USMC" as the acronym for the United States Marine Corps. The acronym was defined in its first use in the BA as well as in the list of Acronyms and Abbreviations in the BA.
    f. The second sentence of the 2014 BA added language from page 75 of the 2010 BO to include "The fiscal year (FY) 2010 level of funding for the Federal interagency BTS interdiction effort on Guam, CNMI, and Hawaii and 2010 transportation levels associated with outbound cargo from Guam for the U.S. or U.S. territories will be used as the baseline."

g. In the 2010 BO the term “DoN” is used and in the 2014 BA we used “DON” as the acronym for Department of the Navy. The acronym was defined in its first use in the 2014 BA as well as in the list of Acronyms and Abbreviations in the BA.
h. In the 2010 BO the term “current” is used and in the 2014 BA the word was not included. We do not believe it changes the text substantively.
i. In the 2010 BO the U.S. Code for the Brown Tree Snake Control and Eradication is not included but is included in the 2014 BA. We believe this enhances the language.
j. In the 2010 BO, page 18 includes the following language “The DoI agrees that it is not DoN's responsibility to fund increased interdiction measures that are identified more than one year after the end of the fiscal year in which both Marine Corps relocation construction undertaken to implement the proposed relocation decisions made in the Record of Decision (ROD) for the "Environmental Impact Statement/Overseas Environmental Impact Statement for Guam and CNMI Military Relocation: Relocating Marines from Okinawa, Visiting Aircraft Carrier Berthing, and Army Air and Missile Defense Task Force" has ended and the permanent nontransient Marine Corps military units relocated as a result of decisions made in that ROD have concluded their relocation to Guam. For the purposes of this Project Description, interdiction is defined as: "to hinder, prohibit, or prevent the brown treesnake from becoming established in new locations by conducting inspection and suppression processes." The 2014 BA does not include this exact text but as stated in Section 2.4.1.f of the BA, summarizes the information as follows: “As stated in the 2010 BO, the DON’s responsibility to fund increased interdiction measures will cease one year after the end of the fiscal year in which both USMC relocation construction has ended and the permanent non-transient USMC military units have relocated to Guam.”

Editorial changes to the language in the BA simply use established acronyms in lieu of formal titles and correct grammar and formatting. The language does not contain substantive edits and the commitment of the DON remains unchanged.

3. **Biosecurity.** The BA provides adequate detail relative to a sub-set of proposed activities related to biosecurity (e.g., Hazard Assessment and Critical Control Point planning and implementation). The 2010 BO addresses four areas of biosecurity:
    1. Micronesia Biosecurity Plan
    2. General Biosecurity Measures
    3. Biosecurity Measures Specific to Training Actions
    4. Biosecurity Measures Specific to Non-Training Actions

The Micronesia Biosecurity Plan has been renamed the Regional Biosecurity Plan (RBP) as the scope was expanded to include Hawaii. We would like to point out that DON has provided $3.7 million for the development of the RBP for Micronesia and Hawaii as part of the original 2010 BO. The RBP is a major conservation measure completed by the DON and serves as the platform for coordination and integration of inter-agency invasive species management efforts such as control, interdiction, eradication, and research. As the plan is implemented by stakeholders and refined over time, the DON and stakeholders will gain additional valuable experience that should improve the overall effort on regional biosecurity.

The DON successfully coordinated with your office on numerous occasions regarding the development of the RBP providing the opportunity to review and comment on the scope of work prior to award of Phase II of the RBP, review and comment on the peer review of Phase I of the RBP, review and comment of the draft Strategic Implementation Plan as well as invitations to the regional workshop where an overview of the RBP development and technical working sessions

were conducted. In addition, we afforded the FWS and all participants additional time to review the RBP at the request of the FWS representative at the meeting.

General Biosecurity Measures originally identified in the 2010 BO were omitted from the 2014 BA and replaced with specific recommendations from the RBP to include (1) Onsite vegetation waste management procedures; (2) DON's *Final Guam Landscaping Guidelines;* (3) Biosecurity outreach and education; (4) HACCP planning; (5) Monitoring to evaluate effectiveness of HACCP; (6) BTS Interdiction; and (7) Rapid Response.

Biosecurity Measures Specific to Training Actions and Non-Training Actions are addressed as part of the Joint Region Marianas (JRM) comprehensive BTS interdiction program to ensure that military activities, including the transport of civilian and military personnel and equipment to and from Guam, do not contribute to the spread of BTS. Interdiction requirements (e.g., trapping and inspections at ports and cargo facilities, aircraft, inspections of household good movements, and biosecurity plans for training events) are specified in these instructions (Appendices B and C of the BA) as well as the annual Work Financial Plan that is developed in cooperation with U.S. Department of Agriculture, Wildlife Services.

In addition, as stated in the BA, the four ranges and associated infrastructure on Tinian are not included as part of the Proposed Action and have an independent disposition from the USMC relocation therefore there will be no off-island training as part of the Proposed Action.

If our response does not address your concerns, during our consultation, please provide further clarification and information relative to the biosecurity measures that are missing from the BA so that we can resolve this issue.

Information Needs Regarding Interdependent and Interrelated Actions

As stated on pages 31 and 45 of the BA, the proposed four ranges and associated infrastructure on Tinian are not included as part of the Proposed Action and have an independent disposition from the USMC relocation. The 2010 BO addressed the Action Area as DoD construction and training on Guam and Tinian. Due to the changes in the Proposed Action, which no longer includes training on Tinian, the Action Area has changed and now only includes lands on Guam.

As stated in the Final Environmental Impact Statement (FEIS), National Security Presidential Directive -23 (Bush 2002) directed the DoD to establish a capability to protect the United States (U.S.) homeland, forces, and its allies from ballistic missile attacks starting in 2004. The ballistic missile defense program develops the capability to defend territories and forces of the U.S. and its allies against all classes and ranges of ballistic missile threats. To protect the territory of Guam and the U.S. forces on Guam from such threats, an Army Air and Missile Defense Task Force (AMDTF) was proposed. At the time of the FEIS, there had not yet been a final determination of whether the Army will be given the ballistic missile mission on Guam, however due to proximity of location and context of time, the FEIS analyzed how that mission would be conducted. The ultimate decision on whether to establish the AMDTF was to be made at some time after the Record of Decision (ROD) (September 2010 ROD *Summary of Decisions A.4.* AMDTF on Guam (Army Decision – Volume 5) on page 91). As stated on page 31 of the BA, the AMDTF assignment to Guam is not included as part of the Proposed Action and has an independent disposition from the USMC relocation. This action is not dependent on the implementation of the proposed military relocation of Marines to Guam. It is not an interrelated activity as it is an activity that is NOT part of the Proposed Action and does not depend on the Proposed Action for its justification. Thus the impacts of the AMDTF assignment to Guam will not be included as part of this consultation.

Cumulative Effects

1. **Civilian Development Activities.** In accordance with the 2012 Roadmap Adjustments, the magnitude of the Marine Corps Proposed Action is reduced from that proposed in the 2010 Final EIS. The relocating population (both direct and indirect) resulting from implementation of the Proposed Action is substantially less than that proposed in the 2010 BO, and the population growth and construction schedule are much more gradual than originally projected.

   In the 2010 BO, cumulative impacts were assessed for project-related development of housing for construction workers, as well as development by civilians indirectly related to the Proposed Action during the construction period. The 2010 BO stated it "is likely to result in an abundance of housing which may be left occupied after the construction period. Housing for approximately 11,000 new non-project-related Guam residents will be developed during the project construction period. The availability of vacant project-related housing during the post-JGPO construction period is likely to reduce the level of other new civilian development. Our calculations indicate construction-worker housing is likely to constitute approximately 50% of total housing becoming available after the buildup period. Although the construction worker housing may not be of the size and development density sought by home-buyers during the post-construction period, availability of project-related housing is not likely to offset all future development pressure. During the construction period, non-project-related population increases on Guam may result in increased civilian development."

   The SEIS provided an update on workforce housing and states "There was workforce housing to accommodate an estimated 3,700 workers in 2009. Most were located at Harmon Industrial Park. Subsequent to 2009, workforce housing projects were approved or pending approval for an additional capacity of 26,500 workers. Most of these projects were never completed or were converted to rental units. The largest proposal, Ukudu Work Force Village, was initially proposed for 18,000 workers by Younex. A capacity of 1,800 workers was approved and under Phase I of construction, 500 units have been constructed. Phase II would require Younex to fund off-site utility improvements to support the worker population per a Guam Waterworks Association permit condition. There have been some short-term uses of the units for student housing; however, the units are generally vacant."

   The relocating population resulting from implementation of the Proposed Action is substantially less than that proposed in the 2010 BO, and the population growth and construction schedule are substantially more gradual than originally projected. Therefore, the assumption in the 2010 BO that construction-worker housing is likely to constitute approximately 50% of total housing becoming available after the buildup period is no longer a valid assumption as the pace and schedule for the relocation construction is more gradual than originally planned and the need for a large influx of off-island workers is no longer necessary.

2. **Wildfire Impacts to Recovery Habitat.** The 2010 BO anticipated a decline in the number of arson-related wildfires on Guam. This was based on an average annual total reported area burned by wildfires dropping by approximately 35% (2,000 ac) in the 1991 through 2002 period, compared with the 1979 through 1989 period. The FWS anticipated the areas burned by wildfires will continue to decline as a result of efforts by the U.S. Forest Service, Federal Emergency Management Agency, and the Department of Interior (DoI) Office of Insular Affairs. This conclusion is still valid for the revised Proposed Action.

3. **Transport of Non-JGPO-Related Items through Ports**. As stated in the 2010 BO, Guam's population will continue to grow even in the absence of the Proposed Action. This continues to be true under the 2014 Proposed Action. According to the 2010 BO, Guam's population growth has shown annual rates of population growth that range from 1.2% to 2.4%. In 2010, Guam was in a low growth phase. Annual population growth, without the Proposed Action, was projected to be 1.2% during the decade of 2010-2020 and 0.9% for the decade 2020-2030 (DoN 2010b, vol. 2 p. 16-3). This translates to a total of 25,000 new Guam residents during the period 2010-2020.

   The concern in the 2010 BO was (1) the potential for the transport of the brown treesnake from Guam to other islands in the CNMI and (2) potential for the brown treesnake introduced to the islands of the CNMI as a result of shipments originating from its native range in Australia, New Guinea, Indonesia, and the Solomon Islands. As stated in the 2010 BO, these risks are mitigated by effective interdiction. There is no indication that DoI Office of Insular Affairs will reduce funding to brown treesnake interdiction in Guam or CNMI or that it will not provide program increases to keep up with the baseline growth of Guam's population and resultant risks associated with increased air transportation and sea shipping. Therefore, the risk of the transport of the brown treesnake from Guam to other locations in the Pacific will remain low. As cited in the 2010 BO, Rodda and Savidge (2007) state that "at the current time the risk of brown treesnake introductions to the Pacific from the snake's native range is considered to be relatively minor for two reasons: (1) the density of brown tree snakes is generally much lower in the snake's native range than it is in Guam, and (2) little cargo destined for tropical and subtropical areas originates in the snake's native range (e.g., Port Moresby, Honiara, Darwin, Halmahera).

   The 2010 BO concluded that the effects of future development (cumulative impacts) to the species and associated recovery habitat were expected to be insignificant. Since the relocating population resulting from implementation of the 2014 Proposed Action is substantially less than that proposed in the 2010 BO, and the population growth and construction schedule are much more gradual than originally projected we expect the effects to species and associated recovery habitat continue to be insignificant.

   The trend in annual area burned has been declining and in the 2010 BO the FWS anticipated it will continue to decline as a result of ongoing and future Federal support of the development of local fire suppression resources. We have no information indicating our Proposed Action would affect the FWS opinion from the 2010 BO.

   Finally, as it relates to Transport of Non-JGPO-Related Items through Ports, the 2010 BO stated these risks were mitigated by effective interdiction and there was no expectation that this would change in the future as a result of the Proposed Action.

   We would like to point out that the conservation measures included as part of our Proposed Action will only enhance and benefit the actions going on in the region. DON has funded the development of a RBP for Micronesia and Hawaii. The focus of the RBP is on various species, not just BTS, and addresses pathway management as DON and others agree it is more efficient to manage pathways and prescribe corrective measures for a suite of species at discrete control points over time. The RBP will provide stakeholders in Micronesia and Hawaii with a platform for coordination and integration of inter-agency invasive species management efforts such as control, interdiction, eradication, and research. In addition, as stated on page 39 of the BA, the DON has committed to funding any increase of current federally funded BTS interdiction measures (in Guam, CNMI, and Hawaii) where the increase is related to direct, indirect and induced growth caused by the USMC relocation to Guam. This additional funding towards BTS interdiction should bolster an already existing effective program.

Development of a Comprehensive Conservation Strategy for Guam and CNMI

The DON has initiated discussion with the Service Headquarters and the Regional Office considering the potential for and benefits of a more comprehensive strategy for threatened and endangered species management and biosecurity implementation that would help enable both current and future military activities in the region. If this initiative proves beneficial and applicable to this Proposed Action we fully recognize implementation will require further consultation.

Excerpt from Draft SEIS for the Guam and CNMI Military Relocation (2012 Roadmap Adjustments) of April 2014

2.2.3 Live-Fire Training Range Complex

The proposed action includes construction and operation of live-fire training ranges and associated range operation and control facilities to meet the individual weapons training/qualification requirements of the Marine force. Photo 2-1 illustrates the standard features of a live-fire training range. The proposed LFTRC would include the following ranges:

- *KD Rifle Range:* The proposed KD Rifle Range would have 50 firing points for 5.56-millimeter (mm) weapons. The range would be 178 yards (163 meters [m]) wide and 500 yards (457 m) from the farthest firing line to the target line). The target line would be flush with the ground, and there would be level ground from the 200 yard (183 m) firing line to the target line. The range would include a 25-foot (8-m) tall impact berm behind the target line. The range footprint would encompass approximately 18.5 acres (7.5 hectare [ha]).

Photo 2-1. Standard Features of a Live-Fire Training Range

- *KD Pistol Range:* The KD Pistol Range would provide 25 firing points for training with 9-mm and 0.45-caliber (cal) weapons. The range would be 41 yards (37.5 m) wide by 50 yards (46 m) long with level ground from the firing line to the target line. The range would include a 12-foot (4-m) tall impact berm behind the target line and 12-foot (4-m) lateral berms. The range footprint would encompass approximately 0.4 acres (0.2 ha).
- *Non-standard Small Arms Range*: The Non-standard Small Arms Range would provide 25 firing points, and be used for training with 5.56-mm weapons. The range would be 68 yards (62.5 m) wide by 109.4 yards (100 m) long with level ground from the 91 m firing line to the target line. There would be a 16 foot (5 m) tall impact berm behind the target line, and 16-foot (5-m) lateral berms. The range footprint would encompass approximately 1.5 acres (0.6 ha).
- *Modified Record of Fire Range (MRF)*: The proposed MRF Range would have 16 firing points for use by 5.56-mm weapons. This live-fire range area would be 175 yards (160 m) wide by 219 yards (200 m) in length with a 25-foot (8-m) tall impact berm at the far end of the range. The range footprint would encompass approximately 7.9 acres (3.2 ha).
- *MPMG Range*: The proposed MPMG Range would have eight stationary firing lanes to support training with 5.56-mm, 7.62-mm, and 0.50-cal weapons, as well as 40-mm inert training rounds (i.e., non-explosive). The range would be 175 yards (160 m) wide at the firing line, expanding to 350 yards (320 m) wide at the far end of the range. The range would be 1093.6 yards (1,000 m) long and would include a 25-foot (8-m) tall impact berm at the far end of the range. The range footprint would encompass approximately 59 acres (24 ha).

Each of the above ranges would include a range operations tower, target storage and maintenance shed, ready issue ammunition magazine, covered bleachers, portable toilets, perimeter fencing, safety signage and lighting, and parking. Range footprints would be entirely cleared of vegetation and the range would be designed so that expended rounds of ammunition would be contained by berms within the footprint.

Following construction, some non-invasive grassy vegetation may be introduced for erosion and storm water control in some areas of the range footprint in keeping with the Guam landscaping guidelines (Naval Facilities Engineering Command [NAVFAC] Pacific 2011).

In addition to the ranges collocated within the proposed LFTRC, the proposed action also includes construction and operation of a separate HG Range at Andersen South. The proposed HG Range would include an area developed as a hand grenade training complex for the M67 fragmentation grenade. The following features would be developed within the hazard zone: a holding shelter for four persons, four throwing positions with grenade sumps, a range control tower with ballistic glass, and a grenade dudded impact area. A grenade house would be collocated with the grenade throwing pits. There would also be a concrete munitions storage facility (i.e., magazine) surrounded on three sides by earthen berms for the temporary storage of hand grenades during training events. In addition to the live-fire area, there would be a non-live fire training area developed adjacent to the range and outside of the SDZ. The training area would consist of a demonstration area with bleachers, an open practice throwing field with various targets and throwing positions, portable toilets, and a parking area. Inert practice grenades would be used at this training area to provide familiarization training prior to proceeding onto the live-fire grenade range.

The LFTRC and the HG Range would be managed in accordance with current Marine Corps range management policies and procedures, which are designed to ensure the safe, efficient, effective, and environmentally sustainable use of the range area. A thorough explanation of range management is detailed in the 2010 Final EIS (Volume 2, Chapter 2: Description of Proposed Action and Alternatives, Section 2.3.1.4: Firing General Military Skills, pages 2-58 to 2-59). The same range management activities presented in the 2010 Final EIS would be applied (with any applicable updates) to the LFTRC and HG Range proposed in this SEIS. These would include a range safety program, range maintenance, scheduling, access control, fire management, and environmental protection and monitoring activities.

The acreage requirements for the live-fire training ranges and their associated SDZs are shown in Table 2.2-3.

Table 2.2-3. Size of Live-Fire Training Ranges and Associated SDZs

Weapons Range	*Range Footprint (acre / ha)*	*SDZ (acre / ha)*
KD Rifle Range	18.5 / 7.5	997 / 404
KD Pistol Range	0.4 / 0.2	249 / 101
Non-standard Small Arms Range	1.5 / 0.6	763 / 309
MRF Range	7.9 / 3.2	887 / 359
MPMG Range[1]	59.0 / 24.0	2,768 to 3,458 acre (1,120 to 1,399 ha)
HG Range	23.0 / 9.3	30.7 / 12.4

Note: [1]The SDZs for the MPMG Range were determined using probabilistic modeling based on-site-specific characteristics. The Probabilistic Surface Danger Zone (PSDZ) varies for each alternative. Therefore, the low and high acreages for the SDZs are shown for that range type.
Source: NAVFAC Pacific 2013a.

Establishment of the LFTRC is essential to maintaining training and readiness of Marine Corps personnel on Guam. Range utilization would depend on the number of personnel required to complete annual individual training events, the duration of each event, and the training capacity of each range. Range utilization is estimated to be 39 weeks per year (Marine Corps and non-Marine Corps use) with 13 weeks of non-availability per year for weather, maintenance, and holidays. Night training is estimated to occur twice per week during the qualification periods and would require consecutive firing days. Table 2.2-4 summarizes the estimated average annual range use by Marine Corps units that would occur at the

LFTRC, including ammunition usage at each range. The estimated annual ammunition usage at the LFTRC under the 2012 Roadmap Adjustments would be approximately 47% less than the amount analyzed in the 2010 Final EIS (an estimated 10,134,750 annual rounds). This reduction would result from the changed composition and reduced numbers of Marine Corps personnel that would be relocated to Guam. Table 2.2-4 also shows the additional estimated annual ammunition usage associated with joint use (non-Marine Corps use) of the LFTRC ranges. The demand for joint use of the ranges would not change as a function of the reduced Marine Corps contingent but would be reduced as a function of the reduced number of weeks of range operation (39 weeks per year compared to 45 weeks per year in the 2010 Final EIS).

The stand-alone HG Range would be operational between 8 a.m. – 4 p.m., with an annual estimated grenade expenditure of 421 grenades.

Table 2.2-4. Estimated Average Annual LFTRC Range Usage

Range	*Weapon*	*Ammunition Type*	*Estimated Ammunition Usage*		
			Day [1]	*Night* [1]	*Total*
Marine Corps					
KD Rifle Range	M16/M4	5.56-mm	1,533,300	322,800	1,856,100
	M249 SAW	5.56-mm	59,200	39,664	98,864
KD Pistol Range	M9	9-mm	324,956	19,328	344,464
Non-standard Small Arms Range	M16/M4	5.56-mm	569,356	403,500	972,856
	M249 SAW	5.56-mm	152,736	34,900	187,636
MRF Range	M16/M4	5.56-mm	304,920	62,820	367,740
	M249 SAW	5.56-mm	59,200	17,760	76,960
MPMG Range	M249 SAW	5.56-mm	377,104	0	377,104
	M40/M110	7.62-mm	13,824	4,104	17,928
	M240	7.62-mm	576,716	141,336	718,052
	M107	0.50-cal	3,520	0	3,520
	M2	0.50-cal	190,756	6,180	196,936
	MK19	40-mm inert	84,480	8,448	92,928
	M-203/ M-32 Grenade Launcher	40-mm inert	24,940	2,580	27,520
Marine Corps Total Estimated Use =			4,275,008	1,063,420	5,338,608
Joint Use (non-Marine Corps) Total Estimated Joint Use =			1,104,466	276,116	1,380,582
GRAND TOTAL (MARINE CORPS AND JOINT USE) =			**5,379,474**	**1,339,536**	**6,719,190**

Legend: SAW = Squad Automatic Weapon.

Notes: [1]"Day" operations would occur between 7:00 a.m. and 7:00 p.m. "Night" operations (estimated to occur two nights per week) would potentially occur between 7:00 p.m. and 10:00 p.m. or 6:00 a.m. and 6:59 a.m. Night firing training requirements need to be met during hours of darkness, dusk until dawn, and this timeframe differs from "acoustic" night (10 p.m. to 7 a.m.) used in noise modeling. Of the 1,063,000 rounds expected during darkness, only 326,000 rounds or 7% of the total number of rounds would occur during "acoustic" night, and no training is planned to occur between the hours of 10:00 p.m. and 6:00 a.m.

UDP personnel would generally not be expected to have access to privately-owned vehicles (POVs). Transportation of UDP personnel to and from the LFTRC would be provided using passenger buses. Permanent party officers and Staff Non-Commissioned Officers (SNCOs) would have the option to utilize POVs as transportation to the LFTRC. Lower-ranked personnel would be required to use government-owned vehicles (GOVs) to carry multiple people to and from the LFTRC. Support staff assigned to the ranges may commute via POV or GOV. It is assumed that a proportion of permanent party officers and SNCOs would elect to drive a POV. In addition to transporting personnel, transportation requirements include the movement of equipment and ammunition to the LFTRC via Medium Tactical Vehicle Replacement (MTVR). Each range would also be required to have an emergency response vehicle. The

actual number of emergency response vehicles would vary depending on the proximity of individual ranges to each other. Transportation to/from the range is generally not expected to occur during peak travel hours. A summary of the average daily transportation requirements for the LFTRC by vehicle type based on 39 weeks of range utilization per year is provided in Table 2.2-5.

Table 2.2-5. Average Daily Vehicle Usage for the LFTRC

Personnel/Vehicle Type	*# Vehicles*
Range Support Personnel	20 POVs or 7 GOVs
SNCOs and Officer POVs	12
Buses	6
MTVR	6 to 7
Emergency Vehicles	1 to 2

Legend: POV = privately-owned vehicle; GOV = government-owned vehicle; SNCO = Staff Non-Commissioned Officer; MTVR = Medium Tactical Vehicle Replacement
Source: DON 2013.

2.2.4 Utilities

The DON updated the utilities analysis studies prepared for the 2010 Final EIS to reflect the reduced Marine Corps population and reduced cantonment/family housing area requirements associated with the 2012 Roadmap Adjustments. The updated studies focused on power, potable water, wastewater, and solid waste disposal, and the DON conducted a new evaluation for information technology/communications (IT/COMM) requirements. The studies factored in the anticipated increase in population and associated utility demand, including direct, indirect, induced, and natural growth. The utilities studies also identified needed utility upgrades, technical solutions for upgrades, and options for implementation to yield viable utilities solutions both on and off-base.

Utilities requirements for the proposed action include:

- On-site utilities projects to support the cantonment, family housing, and live-fire range facilities under each project alternative.
- Off-site utilities projects required to connect the proposed Marine Corps facilities to existing military and civilian utilities infrastructure or other proposed facilities.
- Upgrading or augmenting existing military and civilian utilities infrastructure where necessary and appropriate to support the relocation.

Brief overviews of the proposed utility components that would be the same for any project alternative are provided below. Additional site-specific details are included with the description of each project alternative in Sections 2.4 and 2.5.

- *Power.* Under the SEIS proposed action, the demand for electrical power at the cantonment/family housing area would be reduced relative to the 2010 Final EIS and ROD from an estimated 20 megawatts (MW) to approximately 5.7 MW. Consequently, current generation capacity on Guam would be adequate and no power generation upgrades would be required. However, some transmission line upgrades would be required for current transmission infrastructure to function properly and all cantonment/family housing alternatives would require construction of a new onsite substation. For the AAFB Alternative, the plan is to install a dedicated substation for providing power to the cantonment area. This substation would be fed from a new 34.5 kilovolt (kV) switching station being installed for the North Ramp projects. The

Joint Guam Program Office Response to FWS Information Request in Support of Consultation on the Proposed Military Relocation to Guam
December 19, 2014

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
Live-Fire Training Range Complex (LFTRC)	Details regarding operation of the range	Please provide information on the use of lighting (e.g. location, color, intensity, and frequency) for the range and associated facilities. Lighting may impact fruit bats and sea turtles; therefore we need this information to analyze the affects to these species. We suggest language on lighting from JGPO1 be incorporated into JGPO2. After "illumination of beach" sentence include JGPO1 language "including the shielding of lights and directing lighting away from the forest or other wildlife habitat."	Navy would consider editing language to reflect JPGO1 language on lighting. Additional information on the lighting of the LFTRC will be looked into by Coralie.	Per 12/04/14 Navy-FWS meeting, Navy will consider language on lighting and confirm its inclusion in the BA / consultation.	Lighting will be designed to meet minimum safety, sustainability, antiterrorism, and force protection requirements. Hooded lights will be used to the maximum extent practicable at all new roads and facilities within sea turtle land habitat and fruit bat roost areas. "Night-adapted" lights will be installed in the briefing and bleacher areas at NWF and Andy South. Illumination of forest, coastline or beach will be kept to an absolute minimum including the shielding of lights and directing lighting away from the forest or other wildlife habitat. Night-adapted lighting uses bulbs in red or other spectrums that allow a person's eyes to remain adapted to low light or night conditions while still providing enough light for work and safety. Illumination of forest, coastline, or beach will be consistent with range safety and security requirements and kept to an absolute minimum including the shielding of lights and directing lighting away from the forest or other wildlife habitat.
Live-Fire Training Range Complex (LFTRC)	Data on peak noise levels from operation of the LTFRC	We understand that peak noise levels may be unavailable for the GNWR because sound propagation studies were not allowed. However, peak noise levels should be available for DoD lands above the cliff line. The day-night average sound levels, which are averaged over 24 hours and weighted more for nighttime values, are more appropriate for impacts to humans than wildlife. We need to have an understanding of the peak noise disturbance from a training event, not an averaged sound level that includes quiet times. Peak noise levels were provided to us by the USAF for the Divert BO, and have also been used at other military	Navy would use information from peak noise levels from other (surrogate) sites to determine peak noise level for a flat terrain for the 5-ranges or LFTRC complex site, and provide this information to the USFWS. Navy also looked at the ambient noise and a paper is being written up. This information will be provided to USFWS. It was also discussed that the peak noise levels would be modeled within the LFTRC area, similar to what was done for the averaged sound noise level to provide contour lines. Navy would check whether	Per 12/04/14 Navy-FWS meeting, Navy will provide information to USFWS.	To be provided in Oahu the week of January 5th. DON proposes to present the data and conduct a field tour of MCB Hawaii to demonstrate range usage.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		installations for impact analysis.	this can be done and submitted to USFWS to help inform the analysis in the BO.		
Serianthes tree	Fire Management Plan	We are concerned that the Serianthes tree will burn, without adequate fire prevention measures in place. Review and approve Fire Management Plan prior to construction -similar to what was proposed for JGPO1.	_	Per 12/04/14 meeting, Navy will consider language provided by FWS for fire; Navy and FWS will work to develop a FMP prior to construction of LFTRC.	USFWS suggested DON install a weather station at the proposed LFTRC location to collect weather data to inform the development of the fire management plan. Andersen Air Force Base has a Next Generation Doppler Meteorological Radar System to support mission-related tasks on island. DON is providing the following revised language to replace existing language in the BA. This revised language is based on communications with Dawn Bruns. "Fire management is a key component of range management. The DON goal is to reduce the impact of fires by limiting their frequency, size, and severity while still allowing the USMC to maintain a high level of combat readiness. The range management plan will include the following elements of fire management: 1. A Fire Danger Rating System tailored to the specific military uses at the LFTRC and the local weather and fuel conditions will be established. Weather readings will be taken every hour by remote automated weather stations (RAWS) placed at the installation. This information is immediately available to Range Control, who use the output from the remote automated weather stations to determine the level of fire danger. This, in turn, determines any restrictions placed on military training for that hour. Restrictions are relayed to troops in the field via radio transmission. By restricting highly fire prone activities during periods of high fire danger, the likelihood of a fire start is reduced. Additionally, fires that are ignited are more likely to occur during periods of low or moderate fire danger, making them easier to control and extinguish. 2. Locations and standards of fire breaks and fuel breaks. Fire breaks are similar to four-wheel-drive roads and are cleared of all vegetation to mineral soil. Fuel breaks are swaths of cut, burned, grazed or otherwise modified vegetation so that a fire's behavior is reduced. The fuel break widths are determined by fuels, topography, and prevailing winds. The frequency of a fuel break's upkeep is dependent on the speed of regrowth and/or colonization. Generally speaking, fuel and fire breaks in wetter locations require more frequent upkeep because vegetation will grow more rapidly than in dry locations. 3. Fuels management. All available fuel management techniques will be considered for fire break, fuel break, or fuel management area. Standard on-the-ground application is limited to mechanical cutting, herbicide application, and prescribed fire. The LFTRC range berms will contain native or non-invasive herbaceous vegetation. The vegetation will follow the Guam Landscaping Guidelines. 4. Fuel management corridors (FMC) will be established and maintained providing areas through which fire will not carry. The FMC will provide several distinct areas where fire may be contained in order to prevent a catastrophic fire event. Each corridor will be approximately 100 to 300 m wide, although terrain, safety concerns, or protected resources may constrain the width in some areas. FMC will be situated immediately adjacent to the forest edge, along the outer perimeter of each range, so that there is no herbaceous vegetation along the edge of the forest. Fuel specifications within the FMC require that density of herbaceous material not exceed 20 percent.

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					Cover of fuel within the FMC will be monitored on an annual basis to ensure density of herbaceous material does not exceed 20 percent with a 10 m^2 area. 5. Standard Operating Procedures (SOP). SOPs outline responsibilities for fire prevention, Fire Danger Rating System usage, staffing levels, equipment caches, fuel modifications, proper fire suppression actions, and post-fire reports. The SOPs also include fire prevention briefings to be given to range users prior to commencement of training, notification lists in case of fire, operational decision charts for fires, and maps of resources, fuels, fire breaks, and Fuel Management Areas. 6. Range Control approval and guidance. Prior to firing all pyrotechnics (including tracers), Range Control approval and guidance must be obtained. Fire Department and Range Control personnel will have the authority to stop live-fire training for non-compliance with any training regulation and/or Standard Operating Procedures. 7. Fire Suppression. Water trucks (pickup truck with a tank in the back) will be on-site as a first responder vehicle. Water trucks may be supported by a fire truck or helicopter, as warranted."
Serianthes tree	What vegetation would be cleared	The Navy letter confirmed that clearing would take place to the north, east, and southern sides of the tree and up to a 100-foot buffer.	Note: Seeding of cleared area would include grass-type seeds.	Information clarified per Navy letter.	No action required.
Serianthes tree	Provide analysis that 100-ft buffer is adequate to protect tree from winds	The clearing of forest habitat surrounding the Serianthes tree may increase the likelihood that the tree will be downed by strong winds or other changes to microclimate from 100-ft buffer on 3 sides. We request Navy increase the buffer or provide more data that 100 feet is	Navy stated that the 100-foot buffer cannot be increased and Navy explored every configuration. FWS will check with plant recovery biologist on additional information that can augment the analysis presented in the BA.	Information confirmed in Navy letter and during 12/04/14 Navy-FWS meeting.	DON proposes retaining the services of a certified arborist to install guy wires on this tree to provide anchorage and remove the possibility of toppling during future typhoons.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		sufficient. 100-foot buffer is based on construction activities, not wind load. Without an adequate buffer and fire management plan, we are considering a LAA for Serianthes.			
Serianthes tree	How will operation of LFTRC affect access to the Serianthes seeds and seedlings?	Will access still be allowed to the adult Serianthes tree? Current response in the Navy letter leaves open that range manager could routinely deny access. We understand access will not be possible when the LFTRC is in use. How often will this access be allowed? How much a delay after a request? How will this impact recovery effort for Serianthes if access to the only adult reproducing tree on Guam is limited?	Similar to the current coordination being done to access the adult tree, a request for access would need to be received by DOD. Research projects that are being conducted at the Serianthes site would continue. Access to adult tree to collect seeds, saplings, and for monitoring the condition of the tree would be granted; however the range operations is the first priority.	Information clarified/received per the 11/07/14, Navy letter and 12/04/14, meeting.	From the March 2014 Serianthes Monitoring at Andersen Air Force Base by Thomas Marler, Isla Paraiso "We have completed the calculations of seedling longevity for the seedlings that emerged from 15 November 2012 through the end of November 2013. All of these seedlings have died, so the data set is complete at 482 seedlings with known emergence and death dates. About a third of the seedlings died in 15 days or less, and 57% of them died in less than 30 days. Only four seedlings from the set of 482 lived longer than 210 days. Clearly, one of the most urgent needs for future planning is to determine the cause of 100% seedling mortality, considering this very large recruitment potential that has been quantified over the course of this project."
Sea turtles	Frequency and timing of beach walks on sea turtle nesting beach	The Navy letter states that patrols and surveys will be conducted less frequent than FWS patrols. - According to Jen C. (Refuge biologist), surveys are conducted once per week. Need to confirm that Navy's response is less than once per week. Please note that if adverse effects to nesting sea turtles cannot be avoided, the determination should be an "LAA".	The purpose of the patrols are to ensure that the area under the surface danger zone is cleared of people prior to the operations of the LFTRC. Patrols would be conducted on the nesting beach prior to the operations of the LFTRC, which will operate daily up to 39 weeks per year. Coralie will check on whether Navy can provide FWS with the frequency of patrols on the nesting beach.	Per 12/04/14 Navy-FWS meeting, Navy will follow up and provide additional information.	The purpose of the patrols are to ensure that the area under the surface danger zone is cleared of people prior to the operations of the LFTRC. Since the GNWR has existing hours of operation (0800-1600) and the gate to the GNWR is locked outside of the hours of operation, the potential for incursion into the SDZ will be limited by the GNWR gate. When operation of the LFTRC is planned, the Marine Corps can deploy Marines SDZ signage on trails and the beach at either end with a phone number to call for access. The hours of operation of the GNWR greatly reduce the need for Marine Corps patrols of the SDZ. Most of the SDZ area can be seen with binoculars from Ritidian Point. If there are indications that people are in the area, a patrol would be deployed to ensure safety. If Marines are deployed to GNWR, it will only be to obtain good vantage points to ensure the safety of the public. The Marines would not walking stretches of the beach but instead utilize existing vantage points to clear the area. An example of an SOP for MCAGCTC 29 Palms California, MCBO 3500.4K. An SOP will be developed for the LFTRC on Guam. The RSO ensures the following before granting clearance to fire: (1) Proper coordination, instruction, and positioning of road guards assigned throughout the RTA. At a minimum, road guards shall: (a) Be posted in pairs. (b) Have positive two-way communications with the RSO. (c) Have their positions recorded by grid location with the RSO.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
					(d) Have a five-gallon water can if separated from other Marines. (e) Restrict access to RTAs by unauthorized personnel. (f) Clear the access of personnel into the RTAs with the RSO. Road Guard. An individual designated to maintain surveillance over an assigned locale to prohibit unauthorized entry into a surface danger area, Range or Training area and to give the alarm in the event that entry is detected. Road Guards will always be employed in pairs.
Sea turtles	Avoidance and minimization measures provided	Without adequate avoidance and minimization measures, USFWS is concerned that sea turtles on the beach could be harassed by DoD personnel. USFWS recommends additional avoidance and minimization measures to avoid adverse effects to sea turtles including 1) specifications on lighting used by DoD while walking the beach (for example use low-watt flashlights with a red light), 2) conducting turtle nest surveys during breeding season to locate and identify nests, 3) establishing buffers around sea turtles and sea turtles nests on beach, 4) implementing specific training for DoD personnel walking beach during breeding season, and 5) coordinating with the GNWR and continued monitoring of nesting sea	Navy is open to considering additional measures for sea turtles and will review and consider the list of measures provided by the USFWS.	Per 12/04/14 Navy-FWS meeting, Navy will consider measures. After FWS receives Navy response, we can confirm or reject the NLAA determination.	DON will add the following avoidance and minimization measures to avoid adverse affects to sea turtles including 1) utilizing night-adapted lighting uses bulbs in red or other spectrums that allow a person's eyes to remain adapted to low light or night conditions while still providing enough light for work and safety, 2) if surveys of the SDZ exceed one per week, DON will conduct turtle nest surveys during breeding season to locate and identify nests, 3) if surveys of the SDZ exceed one per week, DON will establish buffers around sea turtles and sea turtles nests on beach, 4) implementing specific training for DoD personnel walking beach during breeding season, and 5) coordinating with the GNWR and continued monitoring of nesting sea turtles.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		turtles. In addition, we recommend predator control as a conservation measure for nesting sea turtles at Ritidian. Please note that if adverse effects to sea turtles cannot be avoided, the effects determination should be changed to "likely to adversely affect" for sea turtles.			
Sea turtles	More information on lighting	The BA states that "Hooded lights will be used to the maximum extent practicable…illumination of forest, coastline, or beach will be kept to an absolute minimum." Based on this sentence there still could be lighting of beaches. The language in JGPO 1 was stronger, and we request this language be included in the JGPO 2 BA and BO.	Navy would consider editing language to reflect JPGO1 language on lighting.	Per 12/04/14 Navy-FWS meeting, Navy will confirm acceptance of proposed measures for sea turtles.	Lighting will be designed to meet minimum safety, sustainability, antiterrorism, and force protection requirements. Hooded lights will be used to the maximum extent practicable at all new roads and facilities within sea turtle land habitat and fruit bat roost areas. "Night-adapted" lights will be installed in the briefing and bleacher areas at NWF and Andy South. Illumination of forest, coastline or beach will be kept to an absolute minimum including the shielding of lights and directing lighting away from the forest or other wildlife habitat. Night-adapted lighting uses bulbs in red or other spectrums that allow a person's eyes to remain adapted to low light or night conditions while still providing enough light for work and safety. Illumination of forest, coastline, or beach will be consistent with range safety and security requirements and kept to an absolute minimum including the shielding of lights and directing lighting away from the forest or other wildlife habitat.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
Mariana common moorhen	Provide information support "no effect" determination	Our concern is about the roads on Guam that need to be improved to support the JGPO 2 on Guam. The road improvements are the responsibility of FHWA. However, they may be funded by DoD, or else be necessary due to increased military construction and deployment. Therefore, they are an interrelated effect and per section 7 regulations, need to be included in the JGPO 2 consultation. This was discussed at the September, 2014, meeting. These roads may have an effect on the Mariana common moorhen and avoidance and minimization measures, similar to those in JGPO 1, should be included.	The Navy stated that the five road projects do not contain suitable habitat for moorhen. The Navy will send the survey report to USFWS. The five road projects discussed in the BA are the only road project that Navy is proposing for JGPO2; therefore, a "no effect" determination for moorhen is correct.	Information clarified per 12/04/14 meeting.	Excel spreadsheet of "PRE-CONSTRUCTION THREATENED & ENDANGERED (T&E) SPECIES SURVEYS"
Quarry sites	Quarry locations and potential effects on listed species and CH	If the quarry is expanded or new (and T&E species impacted) because of the Navy contract(s), Navy would need to include the quarry activity in the JGPO2 consultation because it is an interrelated action. If no impacts to T&E species form the contracts to the quarries on U.S. soil, then we need confirmation of this from Navy. Suggest establishing sideboards about establishing new quarries or augmenting existing quarries that result in impacts to T&E species. Also, FWS is concerned from a	Navy is not sure if establishing sideboards in their contracts could be done. They will be check into this and get back to FWS. Quarry material from off-island would not be used.	Per 12/04/14 Navy-FWS meeting, Navy will follow up and provide a response.	SEIS estimates that the amount of cut exceeds the amount of fill required. Contract does not prohibit quarry material from off-island. Contractors are authorized to use cut from project site(s) but not required to do so. Best Management Practice for Utilities includes :Comprehensive Waste Management Plan, August 2010 (or any applicable update), and Integrated Solid Waste Management Plan for DoD Bases, Guam, February 20, 2013. Process green waste on-site for reuse (goal of 100%) during construction. Meet 60% diversion rate goal for construction/demolition debris through reuse (including such actions as concrete crushing and reuse as base material and grinding and reuse of asphaltic concrete from roads). Meet goal of 50% diversion rate from disposal for project non-construction/demolition solid waste (not directly generated from materials used for erecting structures). 1. FAR 52.236-7, PERMITS AND RESPONSIBILITIES (NOV 1991) The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occurs as a result of the Contractor's fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may have been accepted under the contract. DON courses of action when dealing with non-compliance with contract: Issuance of Construction Contractor Non-Compliance Notice (CCCN) Apply Payment Retention/Withholding

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		biosecurity perspective that invasive species inadvertently may be brought via off-island material to Guam.			Issue of Contracting Officer Letter of Concern/Cure Letter/Letter to Bonding Agency Unsatisfactory Performance Evaluations Removal of Unsatisfactory Personnel Assessment of Liquidated Damages Termination for Default Debarment
GIS Layers and Shapefiles	Request DoN provide USFWS with shapefiles	We request the shapefiles for the habitat that would be removed. This will help us develop maps and figures for the BO, and also ground-truth, if needed, information on habitat quality and quantity (that would be removed/degraded).	Coralie (Navy) will be on Guam to work with GIS person in two weeks. Shapefiles should be ready after Coralie's visit to Guam and they will be given to USFWS.	Per 12/04/14 Navy-FWS meeting, Navy will follow up and provide a response.	Meeting with Mike Moody on Wednesday, December 17th and Friday, December 19th to resolve GIS data.
Reintroduction of listed species to DoD lands on Guam	Request that the same language be used in JGPO 2 and in JGPO 1			The same language in JGPO1 is in the JGPO2 BA.	No action required.
Brown treesnake interdiction	Request clarification on language regarding DoN obligation to fund continuing increased interdiction measures	The difference between the language in JGPO 1 and JGPO 2 for the subject paragraph are the following words present in the JGPO 1: "that are identified". So per the JGPO 1 BO the intent was that the DoN will continue to fund increased interdiction measures past the one	Navy stated "that are identified" would be placed back into the language.	Per 12/04/14 Navy-FWS meeting, language is sufficient.	BTS interdiction language came from pages 18, 74 and 75 of the 2010 BO. To address the USFWS comment DON has revised the text to read "In addition, as stated in the 2010 BO, the DON will fund any increase of current federally funded BTS interdiction measures (in Guam, CNMI, and Hawaii) where the increase is related to direct, indirect and induced growth caused by the USMC relocation to Guam. The fiscal year (FY) 2010 level of funding for the Federal interagency BTS interdiction effort on Guam, CNMI, and Hawaii and 2010 transportation levels associated with outbound cargo from Guam for the U.S. or U.S. territories will be used as the baseline. That funding will continue and become part of the DON's BTS interdiction funding under authority of the Brown Tree Snake Control and Eradication Act (7 USC § 8501 note) (USFWS 2010a). As stated in the 2010 BO, the DoI agrees that it is not DON's responsibility to fund increased interdiction measures that are identified more than one year after the end of the fiscal year in which both USMC relocation construction has ended and the permanent non-transient USMC military units have relocated to Guam.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		year except for those *that are identified* afterwards. With this language removed from JGPO 2 the language reads that DoN will not fund any interdiction measures past the 1 year. Please add the words *that are identified* back into the JGPO 2 language.			
Biosecurity	Need a comparable level of detail to that provided in JGPO 1 or similar to the draft MITT BO	JGPO1 BO identified conservation measures to minimize the impacts of invasive species (Pages 68 - 76). This included the initial "Micronesia Biosecurity Plan", which is now known as the Regional Biosecurity Plan for Micronesia and Hawaii that provided a detailed framework to establish the plan. Specific details stated that "The DoN will implement biosecurity measures as described...", and included general biosecurity measures, and biosecurity measures specific to: training actions, civilian sector transportation, and non-training actions. There was a commitment by DoN "to fund the increase of current federally funded BTS interdiction measures (in Guam, CNMI, and Hawaii) where the increase is related to direct, indirect and induced growth caused by the Marine Corps relocation to Guam." Need assurances that DoN will commit to	It was discussed some biosecurity measures are covered in the JGPO2 BA, but there is biosecurity measures that was worked out for the MITT BO that we would like to consider for inclusion into the JGPO2 consultation. FWS will provide Navy language to consider.	Per 12/04/14 Navy-FWS meeting, Navy will consider MITT BO biosecurity language for inclusion into the JGPO2 consultation.	Based on the call and follow up e-mail with Domingo Cravalho on December 10, 2014, DON is revising the Section 2.4.1.2 e. Monitoring to evaluate effectiveness of HACCP, to include the DON commitment to respond to any incipient invasive species that is discovered in the proposed action area.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		the establishment and implementation of a sound biosecurity plan within Micronesia and Hawaii including funding support that prevents invasive species introduction and establishment (interdiction), early detection and rapid response capabilities, and long-term control and management of established non-native invasive species attributed to the proposed action.			
Biosecurity		In addition, JGPO1 BO also provided much more detail on the risk of invasive species attributed to the build-up (pages 150 - 154). It was stated: "Implementation of the proposed project is likely to increase the risk of introducing or spreading non-native terrestrial and aquatic invasive species including plants, animals, and microbes." Several examples of impacts from non-native invasive species were also provided including mammals, reptiles, invertebrates, and disease. It was later suggested that since the risk of introduction and	Note: the training exercises would fall under the MITT BO.	See above status on biosecurity	No action required.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		establishment of invasive species is highly variable across taxa and habitats, a more efficient approach would be to address pathways where numerous species from different taxa may be inadvertently introduced and implement prescriptive measures to control risks from the pathways. This supported the implementation of a regional biosecurity plan that would address activities at military and commercial ports (air and sea transport).			
Biosecurity		**ALTERNATIVE:** Utilize the proposed measures to address invasive species transport and introduction as found in Appendix B of the draft MITT BO, which includes: (1) Updating the COMNAVMAR INST 3500.4A with respect to BTS control and interdiction requirements; (2) Finalize a JRM BTS Instruction; (3) Implement 100-percent inspection of all aircraft and cargo/equipment leaving Guam; (4) Tactical exercises will involve only cargo/equipment that has not originated from BTS high-risk areas or 100-perecnt canine inspection; (5) Training ops from Guam to Saipan and then FDM require canine inspection or other BTS inspections including visual	In the past, Navy and FWS discussed referencing instructions, and any update to 2005 and 2006, documents would need to be done separately. Suggestion of Domingo (FWS) and Steve M. (Navy) to work together on any language updates that could be included in the JGPO2 consultation. Domingo will contact Steve.	Per 12/4/14, meeting, Domingo will contact Steve to further discuss biosecurity language that would be included or at least considered by the Navy, to be included in the JGPO2 consultation.	No action required. The instructions referenced in the BA are based off of existing, signed instructions and represent our commitment to management of the resource. We do not anticipate new instructions being signed prior to the conclusion of the JGPO consultation.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		inspections on FDM; (6) Establish and maintain BTS-free barriers; (7) Coordinate with the CNMI and Service to ensure BTS coordination for training activities are adequate and provide support, if necessary; (8) Prior to the movement of equipment and troops between islands a pathway risk analysis will be conducted and confirmed by DoN; (9) Utilize ongoing adaptive management to improve methods for BTS rapid response; (10)Provide support for BTS rapid response related to a training activity; and (11) Establish a contractual agreement for adequate rapid response with appropriate agencies to control and eradicate non-native invasive species related to the proposed action.			
Interdependent and Interrelated actions - Tinian training ranges	Please explain why no longer included in JGPO	There is still on-going confusion about the relationship between JGPO, CJMT, and the four Tinian training ranges. In the CJMT Preliminary Draft EIS, the No-Action Alternative includes the four training ranges on Tinian as covered under the JGPO 2010 ROD. Quoted from the CJMT DEIS: "The no-action alternative would continue current training activities on Tinian and complete construction of four live-fire ranges on Tinian contained in the	The Tinian activities are a separate action.	Information received per the 11/07/14, Navy letter.	The JGPO 2 BO will completely supersede and replace the JGPO 1 BO. If the No-Action Alternative for CJMT is selected, no BO will cover the four training ranges on Tinian and if that action were to occur, Section 7 consultation would be warranted to address that action.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
		September 2010 Record of Decision in the Guam and CNMI Military Relocation EIS (DoN and Department of the Army 2010)." Therefore, there still appears to be a potential link between JGPO and the four Tinian ranges. We have the following questions: 1) Will the JGPO 2 BO completely supersede and replace the JGPO 1 BO to the effect that the JGPO 1 will no longer provide coverage for any DoN actions? 2) What BO will the four training ranges on Tinian be covered by if the No-Action Alternative for CJMT is selected?			
Interdependent and Interrelated actions - missile defense	Please explain why no longer included in JGPO	Similar to the DOD activities conducted on Tinian, we are concerned about the piecemeal approach to the JGPO2 section 7 consultation, and question why the missile defense system is no longer part of the JGPO2 consultation. A missile defense system at NWF was included in the JGPO1 consultation (BO).	The THAAD missile defense system is a separate action.	Information received per the 11/07/14, Navy letter.	No action required.
Cumulative effects - civilian development	Provide a more robust analysis	We will work on updating the cumulative effects section.	FWS will work on updating the cumulative effects civilian analysis.	Information not received, but FWS will work on this analysis.	No action required.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
Cumulative effects - wildfire	Provide a more robust analysis	Please provide updated information regarding the U.S. Forest Service, FEMA, and DoI efforts to reduce acreage burned. The information provided was current in 2010.	Coralie (Navy) will provide additional information on this. We request that the Navy ask the US Forest Service (Trudie Mahoney) and Gov Guam for information including the number of fires or acres burned that will enable us to substantiate that the rate of forest habitat loss in South Guam has slowed. In addition we request an update on efforts underway to reduce fire impacts in South Guam. Dawn (FWS) offered assistance, if needed.	Per 12/04/14 Navy-FWS meeting, Navy will follow up and provide a response.	
Cumulative effects - biosecurity	Provide a more detailed analysis	The current BA does not adequately provide enough information to assess the cumulative effects of the proposed actions as it relates to biosecurity. A general statement on page 84 states that " There are local and federal initiatives and protocols to prevent the introduction of non-native species." These local and federal initiatives and protocols should be clearly stated within the current BA.	It was discussed that language was from the JGPO1 consultation, and Navy is not sure about the reference to the federal initiatives and protocols.	Information clarified during Navy-FWS 12/04/14 meeting.	No action required.

Concern in USFWS Letter	Information USFWS needs	FWS information request or clarification	Navy's response	Status of information gap	Navy's response
Guam National Wildlife Refuge (GNWR) facilities	This information request was inadvertently left out of our letter.	The BA includes a brief description of the construction activities and location of the proposed new facilities for the GNWR. In order to fully analyze the impacts of these activities on federally-listed species and designated critical habitat, we request information on location of staging areas, timeframe and description of demolition activities, including road work. Please clarify whether 14.42 acres (Table 6-1 in BA) or 12 acres (page 18 in BA) of CH would be cleared as a result of the proposed new facilities.	The project would result in the clearing of 12 acres (not 14.42 acres) of critical habitat for the proposed facilities on the GNWR. Page 19, figure 2.5 in BA provides the general layout of the proposed facilities on the GNWR. The existing GNWR facilities will not be demolished.	Information clarified during Navy-FWS 12/04/14 meeting.	The proposed area for the new GNWR administration buildings, visitor's center, and associated road and parking lot is approximately 12 acres (5 ha).

DEPARTMENT OF THE NAVY
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November 24, 2014

Mr. Michael Tosatto
Regional Administrator
National Marine Fisheries Service
Pacific Islands Regional Office
1845 Wasp Blvd., Building 176
Honolulu, HI 96818

SUBJECT: POTENTIAL EFFECTS OF THE GUAM AND COMMONWEALTH OF NORTHERN MARIANA ISLANDS (CNMI) MILITARY RELOCATION (2012 ROADMAP ADJUSTMENTS) ON ESSENTIAL FISH HABITAT

Dear Mr. Tosatto,

The Department of the Navy (DON) requests consultation with the National Marine Fisheries Service (NMFS) regarding the potential effects of the proposed Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation (as addressed in the 2014 Draft Supplemental Environmental Impact Statement [SEIS] for the subject proposed action, and amended as described below) on Essential Fish Habitat (EFH) as required by the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.). Specifically, the DON is requesting consultation regarding the effects of increased wastewater effluent associated with the proposed subject action that would be discharged from the outfall pipe of the Northern District Wastewater Treatment Plant (NDWWTP), a Guam Waterworks Authority (GWA) facility.

As previously discussed with your office, the DON completed consultations related to the Guam and CNMI Military Relocation Final EIS in 2010. This request for consultation addresses those elements that have been revised from the 2010 final action and are subject to further environmental analysis in the SEIS. Relevant information about the updated proposed action and the DON's rationale surrounding the NDWWTP and its potential effects on marine resources are discussed below. Extensive details about the proposed action are available in the Draft SEIS at http://guambuildupeis.us.

On April 27, 2012 the U.S.-Japan Security Consultative Committee issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Roadmap for Realignment Implementation. In accordance with these "2012 Roadmap Adjustments," the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially smaller and reconfigured force on Guam than the force structure analyzed in the Guam and CNMI Military Relocation Final EIS in 2010. In conjunction with the changes in the mix of personnel involved in the relocation, the adjustments would reduce the originally planned relocation of approximately 8,600 Marines and approximately 9,000 dependents to a force of approximately 5,000 Marines and approximately 1,300 dependents. That decision prompted the DON's review of the actions previously planned for Guam and approved in the September 2010 Record of Decision (ROD). This review concluded that while

some actions remained unchanged, others, such as the size and location of the cantonment and family housing areas could significantly change because of the force modification. Therefore, pursuant to 40 CFR § 1502.9, the DON prepared a Draft SEIS for the purpose of supplementing the portions of the 2010 Final EIS regarding the establishment on Guam of a cantonment, family housing, a live-fire training range complex (LFTRC), and associated infrastructure to support the relocation of a substantially reduced number of Marines and dependents than was previously analyzed.

The Draft SEIS was released for public comment on April 18, 2014 (79 Federal Register 21907). The DON has modified the preferred alternative as identified in the Draft SEIS. After receipt of several regulatory agency and public comments on the Draft SEIS requesting the DON explore additional means to minimize the loss of vegetation and habitat necessary to support the recovery of federally-listed threatened and endangered species on Guam, the DON identified a new preferred alternative. The DON's preferred alternative as will be identified in the Final SEIS, is to construct and operate a cantonment at Naval Base Guam – Telecommunications Site Finegayan, family housing at Andersen Air Force Base (AAFB) in the existing housing location, and a LFTRC at AAFB – Northwest Field (NWF). This preferred alternative moves housing from an undeveloped area to an area that is already developed as family housing thus avoiding impacts to habitat and proximity to sensitive marine environments (e.g., the Haputo Ecological Reserve Area [ERA]). Please note that the proposed action analyzed in the Draft SEIS neither includes construction of transient aircraft carrier berthing in Apra Harbor nor the Army Air and Missile Defense Task Force (AAMDTF) deployment that were addressed in the 2010 Final EIS. The ultimate disposition of those actions is independent of the SEIS proposed action.

The proposed action is a decrease in magnitude from the action described in the 2010 ROD. The preferred alternative when compared to that identified in the Draft SEIS reduces the impact to vegetation by approximately 250 acres and eliminates the construction and housing within the proximity of sensitive marine habitats. As concluded in the Draft SEIS, the following elements of the updated proposed action result in no direct impacts and less than significant indirect impacts to EFH:

- Access restrictions to sensitive marine habitats (Haputo ERA);
- Environmental education and outreach for the construction workforce;
- The nominal quantity of bullets that may overshoot the bermed areas of the LFTRC and enter the marine environment;
- The implementation of Best Management Practices (BMPs) to capture, and treat stormwater runoff and reduce point and non-point source discharge rates; and
- The construction and operation of the family housing at AAFB and the LFTRC at AAFB-NWF (preferred alternative).

There would be no impact to EFH from stormwater, sedimentation, or other nonpoint source pollution from construction projects due to compliance with the Construction General Permit and the implementation of appropriate construction BMPs. Incidents of inland construction stormwater discharges in northern Guam to marine waters are not likely to occur due to high percolation rates over limestone terrain. DON has therefore determined that with implementation of appropriate construction BMPs the potential for such incidents is extremely low from the main cantonment, LFTRC and housing preferred alternatives.

Current Circumstances

The 2010 Biological Opinion (BO) concluded insignificant effects from changes to wastewater effluent; however, the DON recognizes that wastewater from sewage treatment plants such as the NDWWTP is an important nearshore water quality issue. Under the DON's preferred alternative, an increase in discharge from the NDWWTP is anticipated. The NDWWTP is not operating in compliance with the U.S. Environmental Protection Agency (EPA)-issued National Pollutant Discharge Elimination System (NPDES) permit of April 2013. This permit requires the NDWWTP to achieve secondary treatment capability. Additionally, a 40-port diffuser for the end of the outfall pipe has not been installed. The diffuser would need to be installed on the NDWWTP outfall and upgrades to secondary treatment made at the NDWWTP in order to meet the terms and conditions required by the 2013 NPDES permit. Until the upgrades are completed and operational, additional wastewater discharge from the proposed action and all other wastewater sources to NDWWTP would only be treated to primary treatment standards.

The outfall of the NDWWTP was installed in January 2009 at a depth of 140 feet (42.6 m) at a distance of 1,900 feet (580 m) offshore. It is located north of Tanguisson and Tumon Bay and south of the Haputo ERA. Summary figures from the most recent GWA Receiving Water Quality Summary Fourth Quarter 2014 report (Enclosure 1) for samples taken in the vicinity of the NDWWTP discharge location suggests elevated levels of nutrients which are above Guam Water Quality Standard (GWQS). Sample results for nitrogen-containing compounds are displayed in Table 1 below. The GWQS for nitrate is 0.2 milligrams per liter (mg/L) and for ammonia is 0.02 mg/L. In addition to contributions from the NDWWTP, there are a number of nonpoint and other point sources contributing to degraded water quality along the west coast of Guam including discharge from WWTPs that would not be affected by the proposed action.

Table 1. Nitrogen-related Water Sample Measurements – July-September 2014

Sampling Location	TKN (mg/L)*	Ammonia (mg/L)	Nitrate (mg/L)
Shoreline Station A	0.167	0.011	0.110
Shoreline Station B	0.404	0.013	**0.317**
Offshore Station C	0.140	<0.01	0.034
Offshore Station D	0.156	<0.01	0.037
Offshore Station E	0.174	**0.042**	0.035

***Notes*:** * TKN = total Kjeldahl nitrogen. **Bold** = exceeds GWQA standards.
Data taken from the GWA Receiving Water Quality Summary Fourth Quarter 2014 report. Offshore stations (located in proximity to NDWWTP outfall) were sampled at the surface, 50 ft. (15.2 m), and 100 ft. (30.3 m) depth.

Water quality reports also suggest that impacts from nonpoint source runoff appears to impact water quality significantly more than the WWTPs. Approximately 100 million gallons per day (mgd) of freshwater discharges to near-shore waters of the west coast of Guam (USGS 2014). Assuming a groundwater nitrate concentration of 1 mg/L (typical of northern Guam), the nitrate loading from direct discharges from the NDWWTP is a very small percentage (around 0.001%) of nitrate loading from groundwater discharge. This is based on a typical 9 µg/L concentration of nitrate from primary treated effluent from the NDWWTP at a design capacity of 12 mgd (Source: http://water.usgs.gov/wrri/00grants/ GU bay.pdf).

Elevated levels of nutrients appear to present imbalances that can affect coral reefs. This area of science still leaves many gaps in our understanding. The literature suggests effects of contaminants and elevated levels of nutrients have different effects based on location and various combinations of contaminants. Your office recently supplied Naval Facilities Engineering Command Pacific with a scientific paper and a presentation from University of Guam that indicates that an elevated level of dissolved inorganic nitrogen is correlated with the severity, but not the prevalence, of coral disease in *Porites* species on the west coast of Guam.

There is also a body of literature that indicates that crown-of-thorn starfish (COTS) larvae survivorship increases when nutrient levels increase. This could potentially lead to COTS population outbreaks which in-turn could lead to increased predation on coral henceforth. Although the primary cause of COTS outbreaks is still a matter of scientific controversy, some evidence (Source: http://www.churaumi.net/onihitode/Brodie%20et%20al%20COTS%20 in%20press.pdf) suggests that soil erosion and sediment transport could be a significant contributor to nutrient loading in marine waters and could be of greater influence on COTS outbreaks than wastewater plant outfalls . Land-based runoff is a source of bioavailable nutrients such as ammonia, nitrates, and phosphate. Increased discharges of fresh water into the marine environment also affect salinity which could reach optimal levels for COTS larvae survival during wet seasons with unusually high rainfall.

<u>The Path Forward</u>

The above information indicates that the context for the proposed action is an elevated baseline for contaminants in the near-shore water on the west coast of Guam, particularly nutrients which could potentially affect elements of EFH. The DON acknowledges that contributing flow to the substandard NDWWTP which is currently treating wastewater to an enhanced primary level could add to a suboptimal marine environment. To remedy this situation, installation of the multi-diffuser will occur as part of anticipated upgrades to secondary treatment, which would reduce the size of the zone of initial dilution and greatly improve the dynamics at the end of the outfall pipe. The Administration has taken steps to secure funding for the necessary upgrades to the NDWWTP to bring it into compliance with the 2013 NPDES permit. To that end, in the Fiscal year 2014 Consolidated Appropriations Act Congress appropriated $106.4 million for civilian water and wastewater improvements on Guam. Please note that these appropriated funds do not expire and remain available until they are expended.

The timetable for the secondary upgrades to the NDWWTP is dependent upon the GWA and EPA reaching an agreement on a suitable implementation schedule. The DON has determined that effects from the increased discharge of wastewater will be minimal and temporary because planned upgrades to the NDWWTP should be implemented before Marine Corps forces relocated to Guam. The DON anticipates that secondary treatment will be achieved by 2020.

There will be a period of time over which the quality of the effluent will improve as upgrades to the NDWWTP are implemented. During that interim period of change, the wastewater will continue to not meet the 2013 NPDES Permit or GWQS (22 Guam Administrative Rule [GAR], Div II, Chapter 5). Accordingly, this request for consultation addresses that period of substandard water quality conditions prior to secondary treatment upgrades.

The Draft SEIS includes a schedule of population increase that will add flow to the NDWWTP. The population to be added to Guam is summarized in Table 2 below. The DON assumes that most direct and indirect population increases will result in additional wastewater flow to the NDWWTP. As stated above, the secondary treatment improvements to the NDWWTP are expected to be implemented by 2020. Until that time, the increase in flow to the plant is estimated at 15-18%. The peak increase in flow would be about 36%, though this peak is anticipated to occur after 2020. This peak flow is well within the current and future capacity of the NDWWTP.

Table 2. Projected Guam Population Increase from the Proposed Action

Year	2015	2016	2017	2018	2019	2020	2021
Population	347	1,724	3,618	4,922	4,941	8,191	9,585

Notes: Population numbers are cumulative. The value for each year includes the people added in the prior year(s). Data was taken from Table 2.2-1 in the Draft SEIS.

The DON has discussed the current state of the NDWWTP and the impending improvements with EPA. EPA has advised the DON that, depending on the treatment technology selected, upgrading to secondary treatment would reduce nutrient load of NDWWTP effluent. The DON acknowledges that it is difficult to quantify by how much. Primary treatment of wastewater allows ammonia to be discharged into the receiving waters, but secondary treatment goes through a step of converting ammonia to nitrate which eliminates an anaerobic step of converting ammonia in the marine environment. Additionally, ammonia is more toxic to marine species than nitrates, thus the reason for an order-of-magnitude difference in the allowable environmental level for the two compounds in the GWQS. It is reasonable to assume that treatment technologies and associated effluent quality will be addressed when improvement designs for NDWWTP are developed and the facility 2013 NPDES permit is renewed. Both of these processes should commence before 2018.

Conclusion:

Scientific literature and a report from GWA indicate that there are currently elevated levels of nutrients measured on the west coast of Guam. Discharge from the NDWWTP contributes to the current nutrient levels. The NDWWTP is out of compliance with its permit issued by USEPA in April 2013. To comply with permit condition requirements, the multi-port diffuser must be installed on the

NDWWTP outfall and secondary treatment upgrades must be completed. The DON will gradually contribute additional flow to the NDWWTP as the population at AAFB and Finegayan increases as a result of the Marines relocating to Guam. The added flow to the NDWWTP should be less than an 18% increase before 2020. Per the Administration's Fiscal Year 2014 budget request, Congress appropriated $106.4M in the 2014 Consolidated Appropriations Act for civilian water and wastewater improvements on Guam necessary to support the military relocation. NDWWTP improvements are expected to be completed by 2020 and the U.S. Environmental Protection Agency has consistently identified secondary treatment upgrades as a priority project.

NDWWTP improvements will reduce biochemical oxygen demand (BOD) and total suspended solids (TSS), may lower the levels of nutrients flowing out of the NDWWTP outfall and will change the ammonia discharged from the NDWWTP to nitrate, which is a less toxic compound for marine species. Prior to NDWWTP improvements, the DON's actions are expected to contribute a small but undetermined amount to nutrient levels that are already elevated. Prior to reaching projected peak wastewater flow associated with peak population increases for the proposed action in 2023 (population 9,721) and after the secondary treatment upgrade has been completed in 2020, nutrient levels are expected to decrease in the environment adjacent to the NDWWTP. The overall effect of the DON's actions to improve NDWWTP treatment capacity is expected to lower the nutrient levels, but there would be an interim period of change when the wastewater discharged from the plant would not meet GWQS. The DON has determined that during the interim period *the proposed action may adversely affect EFH, but effects will be temporary, minimal and insignificant*. The DON is requesting consultation with NMFS about effects to EFH during that interim period.

My office is available to discuss this consultation and any aspect of the proposed action or our Draft SEIS impact analysis and can provide additional information, if needed. My technical point of contact is Dr. Sean Hanser at (808) 472-1388 or sean.hanser@navy.mil. My overall point of contact is Mr. Randel Sablan, JGPO environmental director, at (671) 339-5440 or randel.sablan@fe.navy.mil.

Sincerely,

J.A. CAMPBELL
By direction

Enclosure: 1. GWA Receiving Water Quality Summary Fourth Quarter 2014

SUBJECT: POTENTIAL EFFECTS OF THE GUAM AND COMMONWEALTH OF NORTHERN MARIANA ISLANDS (CNMI) MILITARY RELOCATION (2012 ROADMAP ADJUSTMENTS) ON ESSENTIAL FISH HABITAT

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DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

December 10, 2014

Mr. Michael Tosatto
Regional Administrator
National Marine Fisheries Service
Pacific Islands Regional Office
1845 Wasp Blvd., Building 176
Honolulu, HI 96818

SUBJECT: EFFECTS OF THE GUAM AND CNMI MILITARY RELOCATION (2012 ROADMAP ADJUSTMENTS) ON FEDERALLY-LISTED MARINE SPECIES

Dear Mr. Tosatto:

Pursuant to section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), the Department of the Navy (DON) requests informal consultation with the National Marine Fisheries Service (NMFS) regarding the effects of the proposed Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation on Federally-listed marine species (as addressed in the Draft Supplemental Environmental Impact Statement (SEIS) 2014, and amended as described below). Recalling that the DON previously completed a consultation related to the Guam and CNMI Military Relocation Environmental Impact Statement (EIS) in 2010, the DON will continue to operate under the 2010 Biological Opinion (BO) for the listed marine species addressed under that consultation (i.e., sea turtles). However, since completion of the 2010 consultation there are species that could occur in the vicinity of the proposed action that have been listed under the ESA. Those species are the threatened scalloped hammerhead shark (*Sphyrna lewini*), and four species of threatened coral (*Acropora globiceps*, *A. retusa*, *Pavona diffluens*, and *Seriatopora aculeata*). Accordingly, the DON is requesting a reinitiation of informal consultation to address potential effects to these listed species.

Based on discussions between our offices, the DON is requesting informal consultation for two separate proposed action elements (consultation elements) which may have the potential to affect either the scalloped hammerhead shark or the four species of threatened coral identified above:

1. The effects of the projected increase of effluent from the Northern District Wastewater Treatment Plant (NDWWTP) outfall, a Guam Waterworks Authority (GWA) facility. DON has determined that this element may affect, but is not likely to adversely affect *Acropora globiceps*, *A. retusa*, *Pavona diffluens*, and *Seriatopora aculeata*, and the scalloped hammerhead shark because the effects are insignificant. We request your concurrence with this determination.

2. Revisiting the 2010 consultation to consider the effects of constructing the Amphibious Vehicle Laydown Area (AVLA) in Inner Apra Harbor. The AVLA includes a vehicle ramp which is the only in-water project not completed from the original 2010 EIS. DON has determined that the AVLA project may affect, but is not likely to adversely affect the scalloped hammerhead shark, because the effects are discountable. We request your concurrence with this determination.

Relevant information about the updated proposed action and associated elements and DON's rationale surrounding both consultation elements are discussed below. Extensive details about the proposed action are available in the Draft SEIS at http://guambuildupeis.us.

On August 25, 2010, NMFS issued its BO [PIRO Reference No.: I-PI-08-714-LVA] on the effects to marine species protected under the ESA that could result from the proposed Guam and CNMI Military Relocation. The BO addressed the preferred alternative included in the Record of Decision (ROD) dated September 20, 2010. The BO identified nine potential stressors to marine species that could occur from implementation of the proposed action. These stressors included: elevated noise levels during pile driving, loss or degradation of sheltering and forage habitat, vessel traffic, direct impact by dredging or chiseling equipment, increased artificial lighting, disturbance from human activity and equipment operation, increased turbidity, increased wastewater effluent (primarily from the NDWWTP), and increased construction waste and hydrocarbon-based discharges. Of these nine potential stressors, only two were considered likely to adversely affect green (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*): elevated noise levels during pile driving, and loss or degradation of sheltering and forage habitat. With the exception of the ramp for amphibious vehicles, all of the in-water construction projects covered in the 2010 ROD that had the potential to cause the two stressors to sea turtles in Apra Habor are completed or nearly complete. Operations associated with the in-water actions included in the 2010 ROD were not found to have the potential to cause either of the two stressors that would likely adversely affect green and hawksbill turtles.

On April 27, 2012, the U.S.-Japan Security Consultative Committee issued a joint statement announcing its decision to adjust the plans outlined in the May 2006 Roadmap for Realignment Implementation. In accordance with these "2012 Roadmap Adjustments" the Department of Defense (DoD) adopted a new force posture in the Pacific providing for a materially smaller and reconfigured force on Guam. In conjunction with the changes in the mix of personnel involved in the relocation, the adjustments would reduce the originally planned relocation of approximately 8,600 Marines with approximately 9,000 dependents to a force of approximately 5,000 marines with approximately 1,300 dependents. That decision prompted DON's review of the actions previously planned for Guam and approved in the September 2010 ROD. This review concluded that while some actions remained unchanged, others, such as the size and location of the cantonment and family housing areas, could significantly change because of the force modification. Therefore, pursuant to 40 CFR § 1502.9, the DON prepared a Draft SEIS for the purpose of supplementing the portions of a 2010 Final EIS regarding the establishment on Guam of a cantonment (including family housing), a live-fire training range complex (LFTRC), and associated infrastructure to support the relocation of a substantially reduced number of Marines and dependents than was previously analyzed. The Draft SEIS was released for public comment on April 18, 2014 (Federal Register, Vol 79, No. 75, page 21907-21908) and can be accessed at http://guambuildupeis.us . The DON's preferred alternative is to construct and operate a cantonment at Naval Base Guam, Telecommunications Site Finegayan, family housing at Andresen Air Force Base (AAFB) in an existing housing location, and a Live Fire Training Range Complex (LFTRC) at Andersen Air Force Base – Northwest Field (NWF). This preferred alternative has been modified since the publication of the Draft SEIS in April 2014. After receipt of several regulatory agency and public comments on the Draft SEIS requesting DON explore additional means to minimize the loss of vegetation and habitat necessary to support the recovery of federally–listed threatened and endangered species on Guam, DON decided to create an alternative that moves the preferred housing location from NCTS Finegayan to AAFB. This new

preferred alternative moves housing from an undeveloped area to an area that is already developed as family housing, thus avoiding impacts to habitat and proximity to sensitive marine environments (Haputo Ecological Reserve Area). You will note that the Draft SEIS does not include construction of the transient aircraft carrier berthing in Apra Harbor or the Army Air and Missile Defense Task Force (AAMDTF) deployment that were addressed in the 2010 Final EIS. The disposition of those projects is independent of the SEIS proposed action. In addition, the decision regarding training ranges on Tinian is not affected by the 2012 Roadmap Adjustments, and remains final and is not subject to reanalysis in the SEIS. However, the DON is preparing a combined Draft EIS and Overseas EIS (OEIS) for proposed CNMI Joint Military Training (CJMT) on the islands of Tinian and Pagan. If implemented following completion of the CJMT NEPA process, the decision regarding proposed training ranges as evaluated in the CJMT EIS would supersede the 2010 ROD for the Marine relocation to Guam with regards to Tinian range projects. Consequently, the DON has deferred any implementation of the Tinian training ranges under the 2010 ROD pending the outcome of the CJMT EIS process The 2010 BO addressed DON construction and training on Guam and Tinian. Due to the changes in the proposed action which no longer includes training on Tinian, the action area now only includes lands on Guam.

Since there is no in-water construction associated with the Draft SEIS proposed action and various Federal and DoD policy and guidance documents require low impact design and the elimination of non-point source runoff, the nearshore marine environment will not be directly affected by construction or operation of the proposed action.

CONSULTATION ELEMENT 1 – Potential Effects of Increased Wastewater Effluent

The 2010 BO concluded insignificant effects from changes to wastewater effluent and DON recognizes that wastewater from sewage treatment plants is an important nearshore water quality issue. Under the DON's preferred alternative, an increase in personnel on Guam will cause an increase in discharge from the NDWWTP. Currently the plant is not operating in compliance with its U.S. Environmental Protection Agency (USEPA) issued National Pollutant Discharge Elimination System (NPDES) permit, issued in April 2013. A requirement to comply with the 2013 NPDES permit is the installation of the diffuser and upgrades to secondary treatment. Additionally, the 40-port diffuser for the outfall pipe has not been installed. Until the upgrades are operational, additional wastewater discharge from the proposed action and all other wastewater sources to NDWWTP would continue to be treated to primary treatment standards.

The new NDWWTP outfall was installed in January 2009 at a depth of 140 ft. (42.6 m) and 1,900 ft. (580 m) offshore. It is located north of Tanguisson and Tumon Bay and south of the Haputo Ecological Reserve Area (ERA). Summary figures from the most recent GWA Receiving Water Quality Summary Fourth Quarter 2014 report indicate levels of nutrients above Guam Water Quality Standards (GWQS) in samples taken in the vicinity of the NDWWTP discharge location and in nearshore waters (Table 1). The GWQS for nitrate nitrogen is 0.2 milligrams per liter (mg/L) and ammonia is 0.02 mg/L. In addition to contributions from the NDWWTP, there are a number of nonpoint and other point sources contributing to degraded water quality along the west coast of Guam including discharge from WWTPs that would not be affected by the proposed action. Water quality reports also suggest that impacts from nonpoint source runoff appears to impact water quality significantly more than the WWTPs.

Approximately 100 million gallons per day (mgd) of freshwater discharges to nearshore waters along the west coast of Guam (USGS 2014). Assuming a groundwater nitrate concentration of 1 mg/L (typical of northern Guam), the nitrate loading from direct discharges from the NDWWTP is a very small percentage (around 0.001%) of nitrate loading from groundwater discharge. This is based on a typical 9 μg/L concentration of nitrate from primary treated effluent from the NDWWTP at a design capacity of 12 mgd. (Source: http://water.usgs.gov/wrri/00grants/ GUbay.pdf)

Table 1. Nitrogen-related Water Sample Measurements – July-September 2014

Sampling Location	TKN (mg/L)*	Ammonia (mg/L)	Nitrate (mg/L)
Shoreline Station A	0.167	0.011	0.110
Shoreline Station B	0.404	0.013	**0.317**
Offshore Station C	0.140	<0.01	0.034
Offshore Station D	0.156	<0.01	0.037
Offshore Station E	0.174	**0.042**	0.035

Notes: * TKN = total Kjeldahl nitrogen. **Bold** = exceeds GWQS
Data taken from the GWA Receiving Water Quality Summary Fourth Quarter 2014 report (attached to this letter). Offshore stations were sampled at the surface, 50 ft. (15.2 m), and 100 ft. (30.3 m) depth; see report for details on sampling locations.

The Habitat Conservation Division from your office supplied Naval Facilities Engineering Command Pacific (NAVFAC PAC) with a scientific paper (Redding et al. 2013 – attached to this letter) and a presentation from University of Guam (UoG) that indicates that elevated level of dissolved inorganic nitrogen is correlated with the severity, but not the prevalence, of coral disease in *Porites* species on the west coast of Guam. Besides contributions from the NDWWTP, there are a number of other nonpoint and point sources contributing to degraded water quality along the west coast of Guam not affected by the updated proposed action.

For the installation of the outfall, the USEPA determined under Section 7 of the ESA that contact of federally-protected species with discharge would be "incidental", the action would have no effect on federally-listed species, and EFH would not be adversely affected (NPDES Permit No. GU0020087; *National Pollutant Discharge Elimination System, Agana Sewage Plant Fact Sheet*, EPA, April 2013).

Upgrades to Wastewater Treatment Plants

The above information indicates that the current condition for the proposed action is an elevated baseline for contaminants in the nearshore water on the west coast of Guam, particularly nutrients which could potentially affect elements of EFH. Contributing flow to the NDWWTP, which is currently treating wastewater to an enhanced primary level, could add to a suboptimal marine environment. To remedy this situation, installation of the multi-port diffuser will occur as part of anticipated upgrades to secondary treatment, which would reduce the size of the zone of initial dilution and greatly improve the dynamics at the receiving water. The Administration has taken steps to secure funding for the necessary upgrades to the NDWWTP to bring it into compliance with the 2013 NPDES permit. To that end, in the Fiscal Year 2014 Consolidated Appropriations Act Congress appropriated $106.4 million for civilian water and wastewater improvements on Guam. Please note that these appropriated funds do not expire and remain available until they are expended. Further, the timetable for the secondary upgrades is dependent upon the GWA and the USEPA reaching an agreement on a suitable implementation schedule, but substantial progress toward secondary treatment can reasonably be expected by 2020, before

the peak of the population increase associated with adjusted proposed action.

Consistent with the 2010 BO, the DON has determined that the effects from the increased discharge of wastewater will be insignificant and temporary because planned upgrades to the NDWWTP should be implemented on or around the time Marine Corps forces relocate to Guam. After the plant is upgraded, the quality of effluent water is expected to improve and meet permit standards. The NDWWTP is currently only treating wastewater to an enhanced primary level. Effluent quality will improve as upgrades to the NDWWTP are implemented. During that interim period of change, the wastewater will continue to not meet 2013 NPDES Permit conditions or GWQS (22 Guam Administrative Rule [GAR], Div II, Chapter 5). Accordingly, this request for consultation addresses substandard water quality conditions prior to secondary treatment upgrades.

The Draft SEIS includes a schedule of population increase that will add flow to the NDWWTP. The population to be added to Guam is summarized in Table 2 below. The DON assumes that most direct and indirect population increases will result in additional wastewater flow to the NDWWTP. The increase in flow to the plant is estimated at 15-18% for the interim period and peak increase in flow would be about 36%, though this peak is anticipated to occur after 2020. There are no capacity (volume) issues for the NDWWTP.

Table 2. Projected Guam Population Increase from the Proposed Action

Year	2015	2016	2017	2018	2019	2020	2021
Population	347	1,724	3,618	4,922	4,941	8,191	9,585

Notes: Population numbers are cumulative. The value for each year includes the people added in the prior year(s). Data was taken from Table 2.2-1 in the Draft SEIS.

The DON has discussed the current state of the NDWWTP and the impending improvements with USEPA, which is a cooperating agency on the SEIS. USEPA has advised the DON that, depending on the treatment technology selected, upgrading to secondary treatment would reduce nutrient load of NDWWTP effluent. The DON acknowledges that it is difficult to quantify this reduction. Primary treatment of wastewater allows ammonia to be discharged into the receiving waters but secondary treatment goes through a step of converting ammonia to nitrate which would otherwise occur in the marine environment. Additionally, ammonia is more toxic to marine species than nitrates, thus the reason for an order-of-magnitude difference in the allowable environmental level for the two compounds in the GWQS. It is reasonable to assume that treatment technologies and associated effluent quality will be addressed when improvement designs for NDWWTP are developed and the facility's 2013 NPDES permit is renewed.

Presence of ESA Species in the Vicinity of the NDWWTP

DON has reviewed data that it holds or data that it has access to for the presence of the new listed ESA corals. The information is summarized below:

Acropora globiceps. This species of scleratinian coral occurs on upper reef slopes and reef flats from very shallow locations down to 26 ft. (8 m). It appears to prefer environments where wave motion can be relatively strong. Recent surveys at Tinian for the Commonwealth of the Northern Mariana Islands Joint Military Training EIS have shown this species to be present around Tinian. The species is highly vulnerable to ocean warming and is moderately vulnerable

to disease and acidification. The genus Acropora is considered to be, in general, one of the most susceptible to bleaching. The genus is also susceptible to crown-of-thorns starfish and corallivarous snail predation, but it is not known if *A. globiceps* is a preferred prey species.

DON records have few occurrences for this species around Guam. A presence/absence survey performed by UoG and reported in March 2010 indicates the species to be present on one (1) out of 59 transects in the Orote ERA and one (1) out of 31 transects in the Haputo ERA. Biological monitoring by UoG also reported *A. globiceps* as present in the vicinity of Kilo Wharf in Apra Harbor, but the degree of presence is unquantified. None of the surveys for coral associated with the aircraft carrier wharf in Apra Harbor observed this species.

Gustav Paulay noted in an undated report that *A. globiceps* was identified as *A. wardi* (a variation is *wardii*) in Randall and Meyer 1983. Since then, coral subject matter experts agree that the differences between the two species have become better defined. For comparison, the presence/absence survey by UoG reported *A. wardi* to be present on one (1) out of 59 transects in the Orote ERA and four (4) out of 31 transects in the Haputo ERA. Surveys of mitigation sites for the aircraft carrier wharf in Apra Harbor performed by the consulting company HDR reported *A. wardii* to be present in one (1) out of 53 transects on the west coast of Guam. The density of the species on that transect was 0.2 colonies/m^2, and that transect was located on the north side of Glass Breakwater.

Past confusion has also occurred between *A. humilis* and *A. globiceps*. Scientists who worked for the consultant HDR and conducted the surveys for the previously proposed aircraft carrier wharf in Apra Harbor in 2010 were aware of this issue at the time of the surveys and called it to the Navy's attention. *A. humilis* was identified on surveys of mitigation sites and reported it occurring on four (4) out of 53 transects:

- Three (3) colonies on a transect on the west side of Orote Point; density 0.3 colonies/m^2
- One (1) colony on a transect at Piti, off the point; density 0.1 colonies/m^2
- Two (2) colonies on a transect on the north side of Glass Breakwater; density 0.2 colonies/m^2
- One (1) colony on a transect on at Adelup Point; density 0.1 colonies/m^2

Four (4) colonies of *A.* cf *humilis* were reported on a transect at Orote Point. The notation 'cf.' means "compare with" in Latin, and in the context of taxonomy, means the specimen is almost certainly the named species but is slightly different. The density would be 0.4 colonies/m^2 on that transect. The DON's expectation is that *A. humilis* and *A. globiceps* were differentiated correctly on these surveys.

Biological monitoring by UoG also reported *A. humilis* as present in the vicinity of Kilo Wharf in Apra Harbor, but the degree of presence is unquantified. The presence/absence survey performed by UoG and reported in March 2010 indicate the species to be present on 24 out of 59 transects in the Orote ERA and seven (7) out of 31 transects in the Haputo ERA. Gustav Paulay led the presence/absence surveys for UoG, and it is likely that *A. humilis* was correctly identified on these surveys.

Acropora retusa. This scleratinian coral occurs on upper reef slopes and tide pools ranging at depths of 1 to 15 ft. (0.3 to 5 m). The species is highly vulnerable to ocean warming and is

moderately vulnerable to disease and acidification. As stated above, the genus Acropora is considered to be, in general, one of the most susceptible to bleaching. The genus is also susceptible to crown-of-thorns starfish and corallivarous snail predation, but it is not known if *A. retusa* is a preferred prey species.

The DON found only one record of a species recorded as *Acropora* cf. *retusa* in the data we have available. Surveys of mitigation sites for the aircraft carrier wharf in Apra Harbor performed by HDR reported *A.* cf. *retusa* to be present in one (1) out of 53 transects on the west coast of Guam. The density of the species on that transect was 0.1 colonies/m^2, and that transect was located in Fouha Bay. A coral subject matter expert who worked on the aircraft carrier wharf surveys conveyed to NAVFAC PAC recently that samples of *Acropora* cf. *retusa* from Guam are thought to be awaiting analysis in Dick Randall's lab for positive species identification.

Pavona diffluens. *avona diffluens* is a scleratinian coral that occurs deeper on reefs at 16 to 66 ft. (5 to 20 m). The species forms irregular massive or columnar colonies. It is moderately susceptible to ocean warming, bleaching, disease, and acidification.

The DON found some records of a species recorded as *Pavona* cf. *diffluens* in the data we have available. The presence/absence survey performed by UoG and reported in March 2010 indicates the species to be present on 18 out of 59 transects in the Orote ERA and two (2) out of 31 transects in the Haputo ERA. HDR did perform transects on Orote Point for the Surveys of mitigation sites for the aircraft carrier wharf, but neither *P. diffluens* nor *P.* cf. *diffluens* is reported from those surveys.

Gustav Paulay noted in the undated report referenced previously that *P.* cf. *diffluens* was identified as *P. bipartata* in Randall and Meyer 1983. Coral subject matter experts that have performed surveys for DON feel that *P. diffluens* and *P. bipartata* are distinctive and can be differentiated when examined closely in the field.

Seriatopora aculeate. The DON has no records of *Seriatopora aculeata* being observed around Guam. It is estimated to be a species that is distributed across a broad range of depths—from 10 to 130 ft. (3 to 40 m). The species is thought to be relatively uncommon, so detailed knowledge of stressors is lacking. It is thought to be generally susceptible to ocean warming, bleaching, and acidification. It may be susceptible to predation from crown-of-thorns starfish and corallivarous snails.

There is one record of a species in the same genus, *S. hystrix*, at Kilo Wharf from a Sea Engineering monitoring report. This species is expected to be reasonably abundant below 66 ft. (20 m), and it is a distinctly separate species from *S. aculeata*.

Scalloped Hammerhead Shark (*Sphyrna lewini*). The DON has no data or information on the scalloped hammerhead shark occurring in the vicinity of the NDWWTP outfall. It is known that possible preferred habitat for the species occurs in Apra Harbor (see Consultation Element 2).

In its analysis for the installation of the outfall, the USEPA determined under Section 7 of the ESA that contact of federally-protected species with discharge would be "incidental," and the

action would have no effect on federally-listed species (see NPDES Permit No. GU0020087 and *National Pollutant Discharge Elimination System, Agana Sewage Plant Fact Sheet*, EPA, April 2013).

If scalloped hammerhead sharks are present in the vicinity of the NDWWTP outfall, they would be expected to be adults because juveniles and pups occur within protected embayments and river estuaries (Clark 1971, Holland et al. 1993, Bush 2003). Adults would be expected to move through the area of the NDWWTP outfall and this passing encounter with dissolved nutrients would not be expected to negatively affect the scalloped hammerhead shark. The DON knows of no scientific literature indicating that passing encounters with dissolved nutrients negatively affects pelagic fish.

Summary of Consultation Element 1

Scientific literature and a report from GWA indicate that there are currently elevated levels of nutrients measured on the west coast of Guam. Discharge from the NDWWTP contributes to the current nutrient levels. The NDWWTP is out of compliance with its permit issued by USEPA in April 2013. To comply with permit condition requirements, the multi-port diffuser must be installed on the NDWWTP outfall and secondary treatment upgrades must be completed. The DON will gradually contribute additional flow to the NDWWTP as the population in northern Guam increases as a result of the Marines relocating to Guam. The added flow to the NDWWTP should be less than an 18% increase before 2020. Per the Administration's Fiscal Year 2014 budget request, Congress appropriated $106.4M in the 2014 Consolidated Appropriations Act for civilian water and wastewater improvements on Guam necessary to support the military relocation. NDWWTP improvements can reasonably be targeted for completion by 2020 and the USEPA has consistently identified secondary treatment upgrades as a priority project. The improvements will reduce biochemical oxygen demand (BOD), total suspended solids (TSS), and is expected to reduce total nitrogen loading from the NDWWTP outfall, and will change the ammonia discharged from the NDWWTP to nitrate, which is a less toxic compound for marine species. In addition, DON will encourage GWA to prioritize installing the diffuser at the outfall to reduce the size of the mixing zone from the NDWWTP.

After 2020, nutrient levels are expected to improve per unit of effluent discharged into the environment adjacent to the NDWWTP and be within permit parameters at that time. Prior to that time, DON's actions are expected to contribute a small but undetermined amount to nutrient levels that are already elevated. Prior to reaching projected peak wastewater flow associated with peak population increases for the proposed action in 2023 (population 9,721) and after the secondary treatment upgrade has been completed (expected by 2020), nutrient levels are expected to decrease in the environment adjacent to the NDWWTP. The overall effect of the DON's actions to improve NDWWTP treatment is expected to lower the nutrient levels, but there would be an interim period of change when the wastewater discharged from the plant would not meet GWQS.

Information about the distribution of recently-listed ESA species around the NDWWTP is limited leaving species presence to be inferred from sparse data. *Pavona diffluens* is likely to be present to some degree, but there may be a gradient from the southern part of the west coast of Guam to the north part along which the abundance of *P. diffluens* declines. This species is expected to be moderately susceptible to disease in general, which could be related to water

quality decline. Data suggests that, even with some challenges in identifying the species in the field, the other three species would be present to a very limited degree, if at all, especially in the case of *Seriatopora aculeata* for which DON does not have information suggesting it even exists in the area. None of the recently listed species are of the genus Porites, which is reported in Redding et al. (2013) to be the genus affected by levels of nutrients in the nearshore water off western Guam.

If the scalloped hammerhead shark is found in the vicinity of the NDWWTP outfall, the main concern is that they would swim through water that has elevated levels of nutrients. Exposure to sub-quality water would be expected to be for a limited period of time. Furthermore, preferred nearshore habitat for the shark is more likely to be Apra Harbor and river estuaries than the open water along the west coast of Guam.

Given the limited time that ESA species would be subject to a small increase in nutrients before nutrients would be changed by improvements to the NDWWTP and the low presence or limited time spent by ESA species in the vicinity of the NDWWTP outfall, DON has determined that during the interim period when the NDWWTP improvements are completed *the proposed action may affect but is not likely to adversely affect ESA species, because the effects will be insignificant*. The DON is requesting concurrence with this determination. Corals reefs and other aspects of the marine habitat will be addressed through the DON EFH consultation request of November 24, 2014 to NMFS for the adjusted proposed action.

CONSULTATION ELEMENT 2 – Potential degradation of habitat for the scalloped hammerhead shark

In the original Guam and CNMI Military Relocation EIS, the DON stated that the scalloped hammerhead occurred in Apra Harbor during seasonal spawning (January – March) at one location extending from the entrance channel to the western edge of Big Blue reef, north to Jade Shoals (a Habitat Area of Particular Concern), and easterly into Sasa Bay. Hammerhead pupping events are reported to be rare in the area according to DON scientific divers that regularly dive in the area (personal communications Steve Smith). Recently, Sean Hanser at NAVFAC PAC had an opportunity to talk with Dr. Terry Donaldson at UoG about his observations of scalloped hammerhead sharks in Apra Harbor. Dr. Donaldson said he had seen scalloped hammerhead sharks in the Bay but his observations were anecdotal. The sharks could occur in the Inner Harbor but would be expected to occur more in Sasa Bay. For scalloped hammerhead sharks the Inner Harbor is poor habitat, especially with the human activity and high turbidity while Sasa is much better because of limited human activity and less turbidity. In the Inner Harbor, the best area for the sharks is Abo Cove. Pups or juvenile sharks could conceivably be in either location but Sasa Bay is more likely because it is higher quality environment for the sharks. According to Dr. Donaldson, the scalloped hammerhead is thought to like fresh water and have been known to swim into rivers, and potentially birth pups in these areas. Therefore, the Ylig River, the Talofofo River, and the Pago River deltas are expected locations on Guam to encounter these sharks. The difference between the Ylig, Talofofo, and Pago Rivers and the Atantano River which flows into Inner Apra Harbor is the frequency of disturbance and resulting turbidity. Navy vessel operations in Inner Apa Harbor occur and cause temporary turbidity plumes from propeller wash and resuspension of sediment from tug boats and smaller vessels in addition to turbidity resulting during seasonal high rainfall.

The scalloped hammerhead was not listed at the time of the original Guam and CNMI Military Relocation EIS; however, identification of the stressors that may occur from construction related vessel movements and the related effects to EFH were analyzed (on page 11-94 of Volume 2 of the Guam Buildup Final EIS). These potential effects included:

- Short-term, periodic, and localized disturbance and displacement of motile species (fish) during in-water transit activities
- Short-term, periodic, and localized increase of turbidity (decreased water quality) in the water column from propeller wash
- Short-term, periodic, and localized increase in benthic sedimentation
- Short-term, periodic, and localized potentially significant impacts to eggs and larvae in the upper water column from increased vessel traffic
- Seasonal disturbances to pupping scalloped hammerhead sharks

Construction activities in the Inner Harbor, including the AVLA, were not determined to have an effect on scalloped hammerheads. Effects to hammerhead sharks were limited to effects from increased vessel movement from a tug and scow that would make one round trip/day for six to eight months for dredged material disposal associated with dredging for the aircraft carrier wharf turning basin, which is no longer part of the proposed action. The dredging was unrelated to the AVLA. This minimal and temporary increase of vessel movements would result in short-term and localized disturbances to the water column and organisms living in or on the shallow portions of the benthic substrate due to propeller wash and resuspension of sediments. However, daily vessel traffic in Apra Harbor is normal, thus propeller wash and resupsension of sediments would not be a new condition in the harbor. Short-term behavioral and/or physiological responses by fish (e.g., swimming away and increased heart rate) would result; however, such responses would not be expected to compromise the general health or condition of individual fish. Habitat for this species would not likely be adversely affected with appropriate NMFS best management practices (BMP) being implemented, such as a plan to prevent construction debris from entering or remaining in the marine environment during the project and controlling spills and pollutants from vessel and construction activities (taken from Table 2.1-1 of Volume 7 of the Guam Buildup Final EIS). The probability of collisions between vessels and adult fish, which could result in injury, would be extremely low for individuals in this highly mobile life stage and slow moving vessels within the navigational channel and shipping lanes.

The 2010 Final EIS analysis on impacts to scalloped hammerhead sharks was focused on Outer Apra Harbor, and was based on limited potential occurrence information. However, the AVLA (included in the Record of Decision 2010) will be implemented along Polaris Point's southern coast and east of Alpha Wharf in Inner Apra Harbor (see Figure 2.5-5 on page 2-116 of the 2010 Final EIS). Dr. Donaldson's anecdotal information indicates scalloped hammerheads could occur in the Inner Harbor. The construction location is distant from Abo Cove, which is at the far southern end of the Inner Harbor. The construction area is within a man-made fill area, requires no demolition, and is undeveloped (vacant). The in-water construction that would be required would be for two (2) new concrete ramps, which are similar to recreational boat ramps seen at private marinas. Each ramp would be about 15 ft. (4.5 m) wide. No pile driving would be required to construct the ramps. The plane of the ramp would likely need to be graded with heavy equipment from the shore, but any part of the ramp that must be placed underwater would be of precast sections. The ramp surface would be paved down to an elevation of 3 ft. (0.91 m) below extreme low water. Construction would likely only be during daylight hours, which is

beneficial since scalloped hammerhead sharks have been reported to forage more actively at night (Holland et al. 1993).

Construction activity related to construction of the AVLA is expected to be performed from shore because any modification to the shoreline will occur in depths less than 3 ft. (0.91 m) below extreme low water. Stressors that could affect scalloped hammerhead sharks during construction are:

- Short-term, periodic, and localized disturbance and displacement by construction grading activities
- Short-term, periodic, and localized disturbance and displacement by construction noise
- Short-term, periodic, and localized increase of turbidity (decreased water quality) in the water column from equipment and moving shoreline material
- Short-term, periodic, and localized increase in benthic sedimentation
- Seasonal disturbances to pupping scalloped hammerhead sharks
- Striking hammerhead sharks or pups that move into the construction zone

A very small portion of the shoreline, a little more than 30 ft. (9 m) wide out to 3 ft. (0.91 m) below extreme low water, would be affected by the project. Large construction equipment that would make a noise would not operate in the water. Instead, most noise would come from the buckets and scoops on the equipment grading and removing soil and rocks at the shoreline. Sound levels are expected to be less than 150 dB re 1 μPa 3.3 ft. (1 m) from the source. Although this level of noise could cause a behavioral response and deter hammerheads from using the area temporarily, it would have no physical effects on the sharks. The construction is expected to suspend sediment in the area of the construction, but the US Army Corps of Engineers BMPs require the Navy to install silt curtains in nearshore shallow water areas to control turbidity (from Table 2.1-1 of Volume 7 of the Guam Buildup Final EIS). This will limit suspended sediment to the immediate area of construction. Because the silt curtain is in place, it will be an added deterrent to hammerhead sharks or pups entering the construction area. Placement of silt curtains combined with the expectation that the noise that would be occurring during construction, the fact that hammerheads limit their movement during the day, and the low likelihood of sharks occurring in the Inner Harbor, means that no sharks would be expected to occur in the project area to be struck.

Under the 2010 EIS, use of the ramp will be used for moving amphibious vehicles to and from a vessel for staging and maintenance. Transits between ships and the laydown area would occur between 0700 and 1900 (daylight hours). The ramps will not be for the purpose of training under the original Guam Buildup EIS. Stressors from operating amphibious assault vehicles (AAVs) would be the same as those analyzed for operating the tug and scow, except they would be less impactful, because the tug has a much deeper draft and more powerful engines than amphibious vehicles. Therefore, sediment from the bottom would be suspended to a lesser degree. Landing Craft Air Cushion vehicles ride above the water on a cushion of air and do not stir up the substrate except in very shallow waters. Both vehicles generate about the same amount of sound in the water as a moderate-sized diesel engine boat. Hammerhead sharks and pups can be expected to be mobile enough to avoid being struck by AAVs which would be moving at a relatively slow speed (less than 10 knots) when they approach the ramp.

Summary of Consultation Element 2

Given that there is anecdotal evidence that scalloped hammerhead sharks could occur in Inner Apra Harbor, and that the actions associated with construction and operation of the AVLA was not previously identified as having the potential to significantly affect the species, the Navy concludes that construction and use of the two ramps for the AVLA may *affect, but is not likely to adversely affect the scalloped hammerhead shark*. Because the actual in-water construction activities are limited in scope, occur at the edge of the water, and would only happen during daylight hours, and the scalloped hammerhead shark is seasonal in occurrence, more nocturnally active, and unlikely to occur in the Inner Harbor, *the effects to any scalloped hammerhead shark would be expected to be discountable.* To be consistent with BMP established under Section 7 Consultations for Romeo Wharf repairs in Apra Harbor, the construction contractor will be responsible to visually monitor for scalloped hammerheads, as they would be for sea turtles, and cease in-water construction if a shark is observed within 165 ft. (50 m) of the construction activities. Work would resume if the shark leaves the area of its own accord or after 30 minutes from the last time the shark is observed.

We look forward to your response. My office is available to discuss this consultation and any aspect of the proposed action or our Draft SEIS impact analysis and can provide additional information, if needed. My technical point of contact is Dr. Sean Hanser at (808) 472-1388 or sean.hanser@navy.mil. My overall point of contact is Mr. Randel Sablan, JGPO Environmental Director, at (671) 339-5440 or randel.sablan@fe.navy.mil.

Sincerely,

J.A. CAMPBELL
By direction

Copy To:
PDASN
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MARFORPAC DPRI
PACAFHQ
NAVFACHQ
JRM
NAVFACPAC
NAVFAC Marianas

DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

March 10, 2015

Ms. Cindy Barry
Acting, Field Supervisor, Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
Department of the Interior
300 Ala Moana Boulevard, Room 3-122 Box 50088
Honolulu, Hawaii 96850

SUBJECT: INITIATION OF CONFERENCE FOR PROPOSED LISTED SPECIES REGARDING THE PROPOSED MILITARY RELOCATION TO GUAM

Dear Ms. Barry,

In accordance with Section 7 of the Endangered Species Act, and its implementing regulations [50 CFR 402], the Department of Navy (DON) is requesting to conference on the potential effects of the proposed military relocation to Guam on the Guam species proposed for listing on October 1, 2014. Enclosure (1) is the DON Conference Assessment (CA) for the proposed military relocation to Guam and is provided for your review and consideration. The CA does not re-state the proposed action but is intended to be an appendix to the biological assessment. The CA includes an introduction, best management practices, conservation measures, description of the proposed species that may be affected by the proposed action and our conclusion.

Our affects determinations are as follows:

Scientific Name	Common Name	ESA Status	Affects Determination
Bulbophyllum guamense	Cebello halumtano	Proposed Endangered	May Affect, Not Likely to Adversely Affect (NLAA)
Cycas micronesica	Fadang	Proposed Threatened	May Affect, NLAA
Tabernaemontana rotensis	NCN	Proposed Threatened	May Affect, NLAA
Hypolimnas octocula mariannensis	Mariana eight-spot butterfly	Proposed Endangered	May Affect, NLAA
Partula gibba	Humped tree snail	Proposed Endangered	May Affect, NLAA
Partula radiolata	Guam tree snail	Proposed Endangered	May Affect, NLAA
Samoana fragilis	Fragile tree snail	Proposed Endangered	May Affect, NLAA

NCN – No Common Name

SUBJECT: INITIATION OF CONFERENCE FOR PROPOSED LISTED SPECIES REGARDING THE PROPOSED MILITARY RELOCATION TO GUAM

As discussed during our on-going formal Section 7 consultation, we request that you provide your conference opinion within the biological opinion by the agreed upon May 18, 2015 consultation conclusion date. As requested during our letter initiating formal consultation, we would like to be afforded the opportunity for a seven-day review of the draft version of the biological opinion.

I look forward to your response confirming the receipt of the CA and outlining the dates within which the conference can be completed. Our staffs are making good progress on the consultation and we are looking forward to making the milestone of a draft report in April.

The DON's technical point of contact on this matter is Ms. Coralie Cobb, Naval Facilities Engineering Command, Southwest, at (720) 542-3085 or coralie.cobb@navy.mil. If you have any questions regarding this request please contact Mr. Randel Sablan, JGPO Environmental Director, at (671) 339-5440 or randel.sablan@fe.navy.mil.

Sincerely,

J. A. CAMPBELL
By direction

Enclosure: 1. Conference Assessment for the Proposed Military Relocation to Guam

Copy To:
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NAVFACPAC
NAVFAC Marianas
Headquarters, U.S. Fish and Wildlife Department (Attn: Mr. Dan Ashe)
Pacific Regional Office, U.S. Fish and Wildlife Department (Attn: Ms. Robyn Thorson)

DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON DC 20350-1000

March 17, 2015

Mr. Michael Tosatto
Regional Administrator
National Marine Fisheries Service
Pacific Islands Regional Office
1845 Wasp Blvd., Building 176
Honolulu, HI 96818

SUBJECT: POTENTIAL EFFECTS OF THE GUAM AND COMMONWEALTH OF NORTHERN MARIANA ISLANDS (CNMI) MILITARY RELOCATION (2012 ROADMAP ADJUSTMENTS) ON ESSENTIAL FISH HABITAT

Dear Mr. Tosatto,

As part of our continuing consultation with the National Marine Fisheries Service (NMFS) regarding the potential effects of the proposed Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation (as addressed in the 2014 Draft Supplemental Environmental Impact Statement [SEIS]) on Essential Fish Habitat (EFH), the Department of the Navy (DON) is supplying additional information about elements of the proposed action in this letter. The information supplied here is in response to the February 4, 2015 e-mail from the Habitat Conservation Division in the Pacific Islands Regional Office outlining NMFS's concern for impacts to EFH from the proposed action. This letter also restates information discussed in a conference call between DON, NMFS representatives from your office, and the U.S. Environmental Protection Agency (US EPA) on February 9, 2015.

Wastewater and Nutrient Impacts from the Northern District Wastewater Treatment Plant (NDWWTP)

The e-mail from Habitat Conservation Division clearly expressed concern that upgrading the NDWWTP may not compensate for the volume of added wastewater from personnel that are expected to move to Guam in association with the proposed action. DON, supporting the Office of Economic Adjustment (OEA) and the Economic Advisory Committee (EAC), has been working with US EPA and Guam Waterworks Authority (GWA) staff to plan improvements and develop an implementation plan to upgrade the NDWWTP. The minimum requirements of the design for the NDWWTP upgrade include elements such that the effluent would meet the following:

- Orthophosphate < 10 mg/L;
- Nitrate nitrogen < 40 mg/L; and
- Ammonia nitrogen < 4 mg/L.

Additionally, the minimum requirements of the design would reduce pathogens to the limits outlined in the current NDWWTP National Pollutant Discharge Elimination System (NPDES) permit through a disinfection process. This is something that is not currently performed. Installation of the

121 m (400 ft.) multiport diffuser with 40 ports at the end of the outflow pipe is also a critical element of the NDWWTP upgrade. The diffuser will further reduce the nutrient concentration levels due to the enhanced mixing zone with a reported dilution factor of 200:1. This should facilitate compliance with the following Guam water quality standards:

1. Not cause orthophosphate concentrations in the receiving water to exceed 0.05 milligram/liter (mg/L)
2. Not cause nitrate-nitrogen concentrations in the receiving water to exceed 0.2 mg/L
3. Not cause ammonia concentration in the receiving water to exceed 0.02 mg/L

The upgraded treatment system elements have been planned to meet the current NPDES permit and be relatively simple and cost effective to implement, operate and maintain. The Department of Defense (DoD) and US EPA have finalized a report on public water and wastewater recommendations for the EAC with realistic plans and a schedule specifically for upgrading the NDWWTP. The report will be transmitted to your office under separate cover. The schedule in the report proposes to have the upgrades commence by November 2021 and be fully operational before peak population associated with the relocation.

The fiscal year 2014 National Defense Authorization Act (NDAA) directed the Secretary of Defense to convene the EAC in part to develop an implementation plan that will address public infrastructure requirements necessary to support the preferred alternative. The implementation plan will detail descriptions of work, costs, and schedules for completion of construction, improvements, and repairs to Guam public infrastructure affected by the relocation, including improvements and upgrades to the Guam wastewater system. Section 8102 of the fiscal year 2014 Consolidated Appropriations Act (Public Law No. 113-76) appropriated $106.4 million to the Secretary of Defense, acting through the OEA, for civilian water and wastewater improvements on Guam. These funds have been recommended to be used for the upgrades to the NDWWTP and do not expire and remain available until they are expended. As discussed above, DoD and US EPA have finalized the water and wastewater report for the implementation plan.

The 2015 NDAA continues to require this report. Part (b)(2) of Section 2821 in the 2015 NDAA defines public infrastructure as, *any utility, method of transportation, item of equipment, or facility under the control of a public entity or State or local government that is used by, or constructed for the benefit of, the general public.*

DoD and US EPA have impressed upon the Government of Guam (GovGuam) and GWA the importance and urgency of upgrading the NDWWTP and maintaining it in compliance with Guam Water Quality Standard (GWQS). Upgrades to the NDWWTP are the first priority for the necessary improvements to GWA's wastewater treatment system for the funding that has been appropriated to date. It is important to emphasize that although the proposed action would increase the flow of wastewater to the NDWWTP by about 36%, all of the wastewater from all customers serviced by the NDWWTP would be treated by the enhanced secondary upgrades.

The DON will take into consideration the recommendation from NMFS for avoidance/minimization of effects from nutrients emitted by the NTWWTP. Regarding the NMFS recommendation to utilize composting toilets, it is unlikely that this technology would be a sustainable solution for the DoD on military bases and would not address industrial wastewater. DON acknowledges NMFS' overall message of reducing the quantities of wastewater including that management of crown-of-thorns-starfish (COTS) is a priority for NMFS and closely linked to elevated nutrients in the nearshore environment.

Given the above information, the following answers can be given for specific questions posed in the February 4, 2014 e-mail from Habitat Conservation Division:

Which entity has the final say on plant operations and upgrades?
GWA is the NPDES permit holder and owner/operator of the NDWWTP. NDWWTP upgrades and other water and wastewater improvements necessary to support the relocation of Marines are being closely coordinated with DoD, US EPA, GovGuam, DON, and GWA.

When will the diffuser be installed and how will that change current discharges?
The diffuser will be installed as part of the upgrades to the NDWWTP. Prioritization to install the diffuser as soon as possible will be considered during the design process and in future detailed construction scheduling. With the diffuser installed, mixing zone? and dilution of effluent to an initial dilution ration of 200:1 will occur in the receiving water. The mixing zone dimensions will be consistent with the NPDES permit and water outside the mixing will be in compliance with GWQS. It is not recommended to break out the diffuser as a separate action as that might jeopardize the plant upgrades if there are insufficient funds.

What design will be used for secondary treatment?
Conceptual design details are presented in the water/wastewater report and will include oxidization ditches for biological treatment and oxidation of ammonia nitrogen, anoxic tanks for nitrate removal (denitrification), use of the existing chemical feed systems for ortho-phosphate removal (additional nutrient removal), ultraviolet disinfection to reduce pathogens, and primary and secondary clarification to reduce suspended solids.

What designs are feasible?
While there are a variety of methods for the required wastewater treatment upgrades, technologies proposed for the upgrades will include equipment and processes that can be implemented and maintained easily and relatively inexpensively by GWA. Potential methods of treatment are identified in the water/wastewater report.

What are funding sources? When will they be available? Will they be sufficient?
The initial funding source for the upgrades will be $106.4 million from the Consolidated Appropriations Act (Public Law No. 113-76) of fiscal year 2014. These funds are available until expended, but utilization of these funds is pending the finalization of the EAC implementation plan.

The sufficiency of the funding will be determined leading up to the contract bidding process. If additional funds are required for projects to complete the improvements to Guam's water and wastewater infrastructure necessary to support the relocation of Marines, DoD will request the additional funding as appropriate.

Are there operating cost considerations that need to be considered or offset?
GWA is the agency responsible for operating and maintaining the NDWWTP. The recommended technology is projected to be cost effective to operate. Operation and maintenance costs were evaluated as part of the aforementioned water and wastewater report and will be considered during detailed planning and final design decisions.

Will there be additional steps for denitrification or pathogen removal?
As stated above, the upgrade will include process units for both denitrification (anoxic basins will be added to the oxidation ditches for the enhancement of denitrification) and pathogen removal (the minimum requirements will include a UV disinfection unit).

Can Navy minimize the amount of sewage and/or nutrients in their sewage?
All occupied facilities for the proposed action would be designed to meet LEED Silver or equivalent standards, which include water use reduction criteria. DON's water use reduction goals are directed by Executive Order 13514. Wastewater estimates were generated based on the requirement that facilities must meet the design requirements of the Unified Facilities Criteria. Sustainable approaches to water use in the design of the new Marine Corps facilities will likely reduce the potable water use and wastewater generation..

Where does Navy response end and where does GWA responsibility begin?
NDWWTP upgrades and other water and wastewater improvements necessary to support the relocation of Marines will be closely coordinated with DoD, USEPA, GovGuam, DON and GWA. Once the upgrades are completed GWA will be responsible for operations and maintenance of the system in compliance with US EPA NPDES permits.

What are US EPA's responsibilities in meeting sewage treatment requirements?
US EPA sets numeric limits for the discharge from NDWWTP through the NPDES permitting program and would have input into the NEPA process required for the upgrades to the NDWWTP. Through the NPDES program, US EPA issues permits for all point source discharges in Guam. Permits are written to comply with GWQS, Essential Fish Habitat, Endangered Species, and the Coastal Zone Management Act. Permits are reissued by US EPA every five years.

Can the NDWWTP be maintained to US EPA standards?
Yes, the NDWWTP can be maintained to US EPA standards and GWQS. The upgrades that are being planned will be designed to be sustainable by GWA and GovGuam. With implementation of the proposed technologies, installation of the diffuser and some additional training, GWA's wastewater treatment operations staff are capable of meeting the US EPA discharge permit standards.

Potential Effects of the NDWWTP Effluent on EFH

In the original EFH consultation letter that DON sent on November 24, 2014, DON acknowledged that sufficiently elevated levels of nutrients in nearshore waters can increase COTS larvae survivorship and feed algal growth. Elevated levels of dissolved inorganic nitrogen are also correlated with the severity, but not the prevalence, of coral disease in *Porites* species on the west coast of Guam. Part of the challenge with knowing the cause of the elevated nutrient level is the fact that there are naturally high levels of nutrients that come from the soils and flow through the aquifer of northern Guam. Matson (1993) states that nutrient levels (that he designates as NO*x*) within a kilometer (km) of shore are heavily influenced by water coming through the aquifer. In summary statements at the end of his 1993 paper he indicates that "The NO*x* content of upwind ocean water that floods the reef flats averages 0.27 μM (micromoles), but drops to 0.12 μM within a kilometer of shore. ...at least half of the upwind coastal NO*x* must be from aquifer leakage to windward and subsequent wind-driven circulation along the shore." He goes on to state on the same page that "the aquifer increases the nutrient content of coastal oceanic waters considerably. Even the lowest estimates of aquifer flux...at least doubles the ambient concentration daily." (Matson 1993, p. 370). Results reported for nitrogen levels measured in wells by McDonald (2002) confirm that nitrogen levels can be as high as 4-5 mg/L and that there are areas in the Finegayan, Yigo, and Agana Subbasins of the aquifer that potentially contribute high or rising nitrate-nitrogen concentrations.

The outfall from the NDWWTP lies 1,900 feet (580 m) offshore at a depth of 140 feet (42.6 m). This is within the 1 km (3300 ft) zone of influence described by Matson. The calculated volume of the Guam aquifer is 8.4 billion m^3 (2.219 quadrillion gallons) and 3.8-6.2% (319.2 – 520.8 million m^3, 84.3-137.6 billion gallons) is estimated to discharge to the ocean every day (Matson 1993). That is an average of 6.8±4.2 m^3 per meter of coastline per day (544.4±336.2 gal/ft/day). In the 4th fiscal quarter of 2014, the NDWWTP had an average flow of 6.09 million gallons per day (MGD) and a max of 15.7 MGD (GWA 2014). At its 4th fiscal quarter maximum, the NDWWTP is contributing flow equivalent to 0.00011-0.00019% of the volume of the aquifer per day. The outflow from the NDWWTP may result in highly localized elevations of nutrients in the water, but the overall effect is expected to be swamped out by the flow from the Guam aquifer.

DON acknowledged that some dissolved compounds in the effluent from NDWWTP may have greater effect than others. These effects are expected to be localized to the environment immediately adjacent to the outfall of the NDWWTP and will be eliminated by mixing with the seawater within a few hundred meters of the outfall pipe. It is acknowledged that mixing is not facilitated as well without the diffuser than it will be when the diffuser is installed. The compound in the effluent that is of greatest concern is ammonia.

Ammonia does have deleterious effects on marine wildlife. The toxicity of ammonia to aquatic life is affected by temperature, pH, dissolved oxygen, and salinity (Bower and Bidwell 1978). In general, the higher the temperature and pH and the lower the levels of dissolved oxygen and salinity, the greater the ammonia toxicity. For mobile invertebrates, toxicity appears to increase as salinity

decreases (Miller, Poucher et al. 1990, Chen and Lin 1991), although too few data exist to indicate whether this pattern is typical for all or most invertebrates. A number of studies indicate that ammonia toxicity is greatest to early life stages of invertebrates (for example Wajsbrot, Krom et al. 1990, Feyjoo, Riera et al. 2011, Liao, Wang et al. 2011).

Hatching and growth rates of fishes may be affected (Miller, Poucher et al. 1990, Eddy 2005). Slightly elevated ammonia levels may cause fish to experience a reduction in hatching success, reduction in growth rate and morphological development, and injury to gill tissue (i.e., hyperplasia), liver, and kidneys (Smart 1976, Eddy 2005, Benli, Köksal et al. 2008). In hyperplasia, the gill filaments are swollen and clumped together, reducing the fish's ability to 'breath'. These results have been shown in both fresh and marine water environments (Eddy 2005).

Elevated ammonia levels can also lead to ammonia poisoning by suppressing normal ammonia excrement from the gills. If fish are unable to excrete this metabolic waste product, there is a rise in blood-ammonia levels resulting in damage to internal organs (Miller, Poucher et al. 1990, Benli, Köksal et al. 2008).

Ammonia exerts toxic effects in the water column and does not accumulate in the sediments. However, sediment dwelling organisms that use water in the boundary layer between the sediment and the water column (molluscs, crustacean, and most annelids) for feeding or respiration could be at risk.

The highest levels of ammonia reported in the GWA Receiving Water Quality Summary Fourth Quarter 2014 Report at any sampling location was 0.042 mg/L (Table 1 in the original DON EFH consultation letter dated November 24, 2014). This level exceeds GWQS, but is below reported values for toxicity from ammonia in the literature.

When the diffuser is installed, the mixing zone will meet the following GWQS:

- The zone of mixing shall be limited to an area that will minimize impacts on uses, and where allowed, will not adversely affect the receiving water's designated uses;
- Water quality standards must be met at every point outside the zone of mixing;
- Zones of passage must be allowed, and mixing zones must not encroach upon areas used for fish harvesting, particularly of stationary species;
- Biologically important areas and habitat for endangered and threatened species must be protected; and
- Mixing zones shall not cause lethal conditions to aquatic life and wildlife passing through the zone or be injurious to human health from temporary exposure.

The permit requires the mixing zone shall to be equal in depth to the depth of the water over the diffuser, and in length to twice the depth of the water plus the length of the diffuser, with the diffuser centered within the mixing zone. After the diffuser is installed, the mixing zone will be 140 feet deep and 680 long.

Effects on EFH Management Unit Species

The Western Pacific Regional Fishery Management Council (WPRFMC) developed a Mariana Archipelago Fishery Ecosystem Plan (FEP) as a Fisheries Management Plan (FMP) for the CNMI region (WPRFMC 2009). They also developed a Pelagic FEP for pelagic fisheries in the western Pacific (WPRFMC 2009). The management units are:

- Bottomfish and seamount management unit species;
- Crustacean management unit species;
- Precious coral management unit species;
- Coral reef ecosystem management unit species; and
- Pelagic management unit species.

These FEPs identify as Management Unit Species (MUS), species known to be present in waters around Guam and the CNMI, and incorporates all of the management provisions of the Bottomfish and Seamount Groundfish FMP, the Crustaceans FMP, the Precious Corals FMP, the Coral Reef Ecosystem FMP, and the Pelagic FMP that are applicable to the area. EFH analysis for the proposed action will address potential project-related impacts on MUS found in nearshore and coastal waters of Guam.

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 United States Code [USC] Section 1802[10]). Waters include all aquatic areas and their biological, chemical, and physical properties, while "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities that make these areas suitable fish habitats (50 CFR Section 600.10). Habitats used at any time during a species' life cycle (i.e., during at least one of its life stages) must be accounted for when describing and identifying EFH. Regional FMCs also designate Habitat Areas of Particular Concern (HAPC). These are specific areas that are essential to the life cycle of management unit species that meet one or more of the following criteria per 50 CFR Sections 600.805–600.815:

1. The ecological function provided by the habitat is important;
2. The habitat is sensitive to human-induced environmental degradation;
3. Development activities are, or will be, stressors on the habitat; and
4. The habitat type is rare.

In the Mariana Islands, EFH includes the entire water column and seafloor, from the shoreline to the boundary of the Exclusive Economic Zone (shore to 200 nautical miles [370 kilometers]) for one species or another.

Table 1 summarizes the EFH components that are considered in the EFH analysis for the proposed action.

Table 1. Essential Fish Habitat and Habitat Areas of Particular Concern Designations for the Mariana Archipelago Fishery Plan Management Unit

Management Unit	*Species Complex*	*EFH*	*HAPC*
Bottomfish Groundfish	**Shallow-water species (0–50 fm [0-300 ft (0-91 m)]):** uku (*Aprion virescens*), thicklip trevally (*Pseudocaranx dentex*), lunartail grouper (*Variola louti*), blacktip grouper (*Epinephelus fasciatus*), ambon emperor (*Lethrinus amboinensis*), redgill emperor (*Lethrinus rubrioperculatus*), giant trevally (*Caranx ignoblis*), black trevally (*Caranx lugubris*), amberjack (*Seriola dumerili*), taape (*Lutjanus kasmira*)	**Eggs and larvae:** the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 1,312 ft (400 m) **Juvenile/adults:** the water column and all bottom habitat extending from the shoreline to a depth of 1,312 ft (400 m)	All slopes and escarpments between 131 and 918 ft (40 and 280 m)
	Deep-water species (50–200 fm [300-1,200 ft (91-365 m)]): ehu (*Etelis carbunculus*), onaga (*Etelis coruscans*), pink snapper (*Pristipomoides filamentosus*), yellowtail kalekale (*P. auricilla*), yelloweye opakapaka (*P. flavipinnis*), kalekale (*P. sieboldii*), gindai (*P. zonatus*), hapuupuu (*Epinephelus quernus*), lehi (*Aphareus rutilans*)	**Eggs and larvae:** the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 1,312 ft (400 m) **Juvenile/adults:** the water column and all bottom habitat extending from the shoreline to a depth of 1,312 ft (400 m)	All slopes and escarpments between 131 and 918 ft (40 and 280 m)
Crustaceans	**Spiny and slipper lobster:** Hawaiian spiny lobster (*Panulirus Marginatus),* spiny lobster (*Panulirus penicillatus, P.* spp.), ridgeback slipper lobster (*Scyllarides haanii*), Chinese slipper lobster (*Parribacus antarcticus*) **Kona crab** (*Ranina ranina*)	**Eggs and larvae:** the water column from the shoreline to the outer limit of the EEZ down to a depth of 492 ft (150 m) **Juvenile/adults:** all of the bottom habitat from the shoreline to a depth of 328 ft (100 m)	All banks with summits less than 98 feet (30 meters) from the surface

Table 1. Essential Fish Habitat and Habitat Areas of Particular Concern Designations for the Mariana Archipelago Fishery Plan Management Unit

Management Unit	*Species Complex*	*EFH*	*HAPC*
Precious Corals	**Shallow-water precious corals (10-50 fm):** black coral (*Antipathes dichotoma*), black coral (*Antipathis grandis*), black coral (*Antipathes ulex*)	EFH for Precious Corals is confined to six known precious coral beds that are not found near Guam	HAPC for precious coral has only been designated in Hawaii
Coral Reef Ecosystems (CRE)	More than 100 species of fish, including the families Acanthuridae, Carangidae, Gerreidae, Holocentridae, Kyphosidae, Labridae, Lethrinidae, Lutjanidae, Mugilidae, Mullidae, Scaridae, and Siganidae. Approximately 40 taxa of invertebrates including 12 crustacean taxa, 24 mollusc taxa, and four echinoderm taxa.	EFH for the CRE MUS includes the water column and all benthic substrate to a depth of 328 ft (100 m) from the shoreline to the outer limit of the EEZ	Includes all no-take Marine Protected Areas identified in the CRE FMP, all Pacific remote islands, as well as numerous existing Marine Protected Areas, research sites, and coral reef habitats throughout the Western Pacific. On Guam: Cocos, Lagoon, Orote Point Ecological Reserve Area, Haputo Point Ecological Reserve Area, Ritidian Point, and Jade Shoals

Table 1. Essential Fish Habitat and Habitat Areas of Particular Concern Designations for the Mariana Archipelago Fishery Plan Management Unit

Management Unit	*Species Complex*	*EFH*	*HAPC*
Pelagic	**Temperate species** Striped marlin (*Tetrapurus audax*), Bluefin tuna (*Thunnus thynnus*), Swordfish (*Xiphias gladius*), Albacore (*Thunnus alalunga*), Mackerel (*Scomber* spp), Bigeye tuna (*Thunnus obesus*), Pomfret (family Bramidae) **Tropical species** Yellowfin tuna (*Thunnus albacares)*, Kawakawa (*Euthynnus affinis*), Skipjack tuna (*Katsuwonus pelamis*), Frigate and bullet tunas (*Auxis thazard, A. rochei*), Blue marlin (*Makaira nigricans*), Slender tunas (*Allothunnus fallai*), Black marlin (*Makaira indica*), Dogtooth tuna (*Gymnosarda unicolor*), Spearfish (*Tetrapturus* spp.), Sailfish (*Istiophorus platypterus*), Mahimahi (*Coryphaena hippurus, C. equiselas*), Wahoo/Ono (*Acanthocybium solandri*), Moonfish/Opah (*Lampris* sp.) **Sharks** Pelagic thresher shark (*Alapias pelagicus*), Bigeye thresher shark (*Alopias*), Common thresher shark (*Alopias vulpinus*), Silky shark (*Carcharhinus falciformis*), Oceanic whitetip shark (*Carcharhinus longimanus*), Blue shark (*Prionace glauca*), Shortfin mako shark (*Isurus oxyrinchus*), Longfin mako shark (*Isurus paucus*), Salmon shark (*Lamna ditropis)* **Squid** Neon flying squid (*Ommastrephes bartamii*), Diamondback squid (*Thysanoteuthis rhombus*), Purple flying squid (*Sthenoteuthis oualaniensis*)	**Eggs and larvae:** the water column extending from the shoreline to the outer limit of the EEZ down to a depth of 656 ft. (200 m) **Juvenile/adults:** the water column extending from the shoreline to a depth of 3,280 ft. (1,000 m)	Water column down to 3,280 ft. (1,000 m) that lies above seamounts and banks with summits shallower than 6,560 ft. (2,000 m) within the EEZ

Notes: HAPC= Habitat Area of Particular Concern, CRE = Coral Reef Ecosystem, FMP= Fishery Management Plan, EEZ= Exclusive Economic Zone, fm = fathoms, CNMI = Commonwealth of the Northern Mariana Islands, N = North, W = West, E = East

Sources: WPRFMC (2009) *Fishery Ecosystem Plan for the Mariana Archipelago* and WPRFMC (2009) *Fishery Ecosystem Plan for Pacific Pelagic Fisheries of the Western Pacific Region*

Bottomfish and Seamount Groundfish Management Units

There are currently two complexes of Bottomfish Management Unit Species (BMUS) managed by the Mariana Archipelago FEP, a shallow-water and a deep-water complex, separated by depth and species composition (Table 1). The juvenile and adult deep-water complex as well as EFH for seamount groundfish is outside the area of influence for the proposed action. Bottomfishing on Guam is practiced for recreational, subsistence, and small-scale commercial fishing.

The area of influence from the outfall of the NDWWTP is within the designated EFH for bottomfish egg, larvae, juvenile, and adult lifestages for Guam. The WPFRMC designated all escarpments/slopes between 40 and 280 m (132 and 924 ft) as bottomfish HAPC. The outfall pipe for the NDWWTP is positioned at the shoreward edge of BMUS HAPC on the west side of Guam. Localized effects from ammonia may be experienced in the immediate zone of mixing. Bottomfish eggs and larvae may not be able to avoid the zone of mixing, but juveniles and adults are expected to move away from the mixing zone.

Crustacean Management Units

The WPFRMC has designated EFH for crustacean species assemblages. The species complex designations are spiny and slipper lobsters and Kona crab. The designation of these complexes is based on the ecological relationships among species and their preferred habitat. Fishing for these species around Guam primarily occurs in inshore waters, usually in a subsistence or recreational context.

The WPFRMC also designated EFH for deepwater shrimp, but the EFH starts at depths of 300 m (984 ft) and extends significantly deeper. These deeper waters would not be affected by the NDWWTP outflow and therefore deepwater shrimp are not discussed further in this document.

In the southwestern region of the North Pacific, spiny lobsters are typically found in association with coral reefs. The Kona crab is found in a number of environments, from sheltered bays and lagoons to surf zones, but prefers sandy habitat in depths of 78-377 ft (24-115 m).

The WPRFMC designated EFH for spiny and slipper lobster and Kona crab larvae as the water column from the shoreline to the outer limit of the EEZ and to a depth of 492 ft (150 m) throughout the Western Pacific Region. The EFH for juvenile and adult spiny lobster and Kona crab is designated as the bottom habitat from the shoreline to a depth of 328 ft (100 m) throughout the Western Pacific Region.

For Guam, the area of influence from the outfall of the NDWWTP is within the designated EFH for egg, larvae, juvenile, and adult lifestages of crustacean MUS except deepwater shrimp. No HAPC for crustaceans in this Management Unit would fall within the area of effect for the NDWWTP outfall. Localized effects from ammonia may be experienced by crustaceans in the immediate zone of mixing. Eggs and larvae may not be able to avoid the zone of mixing, but juvenile and adult crustaceans are expected to move away from the mixing zone.

Precious Coral Management Units

There is no precious coral fishery currently operating around Guam. Very little precious coral resources are found around Guam. The amount of habitat where the species can grow is limited throughout the Marianas archipelago. Black coral grows in relatively shallow waters of 30–100 m (99 – 330 ft), while pink, gold, and bamboo coral grows in deeper waters of 300 to1,500 m (990 – 4950 ft). If it were present, black corals would be the species complex that could be affected by the NTWWTP effluent. There is no EFH or HAPC designated for precious corals around Guam. Because of the rarity of black coral near Guam, it is unlikely that precious coral is found within the mixing zone of the NDWWTP effluent.

Coral Reef Ecosystems Management Units

Shore-based fishing accounts for most of the fish and invertebrate harvest from coral reefs around Guam. The coral reef fishery harvests more than 100 species of fish. Approximately 40 taxa of invertebrates are harvested by the nearshore fishery, including 12 crustacean taxa, 24 mollusc taxa, and four echinoderm taxa. Live coral cover on Guam's reefs and the recruitment of small corals has been decreasing in Guam since the 1970s. This trend has been attributed to phase shift of reef habitat to communities dominated by fleshy algae, poor recruitment by coral larvae, and increased sedimentation of reef habitat. Corals have also been affected by natural disturbances. The reductions in coral cover and harvest have led to an overall reduction Coral Reef Ecosystem (CRE) MUS.

CRE MUS are linked to specific habitat "composites" (e.g., sand, live coral, seagrass beds, mangrove, open ocean) for each life history stage. Except for several of the major coral reef associated species, very little is known about the life histories, habitat utilization patterns, food habits, or spawning behavior of most coral reef associated species. For this reason, two tiers of MUS have been defined: Currently Harvested Coral Reef Taxa (CHCRT) and Potentially Harvested Coral Reef Taxa (PHCRT) categories.

EFH for the CRE MUS includes the water column and all benthic substrate to a depth of 328 ft (100 m) starting from the shoreline. The NDWWTP outfall falls within this EFH. The closest HAPC is Haputo Point Ecological reserve area on the northwest coast of Guam. It is not within the area of influence of the outfall.

Localized effects from ammonia may be experienced by coral reef habitat and MUS in the immediate zone of mixing. Coral that are persistently exposed to ammonia is likely to die or be stunted. Added volume from the proposed action will not increase the area of coral reef that has already been affected by the effluent from the NDWWTP. As demonstrated above on pages 5 and 6, any increase in nutrients in the water outside the mixing zone will be small compared to the current ambient nutrient levels. The enhanced secondary treatment will also reduce ammonia. Eggs and larvae from coral and MUS may not be able to avoid the zone of mixing, but non-sessile juvenile and adult species are expected to move away from the mixing zone, especially because the mixing zone is expected to be a different osmotic environment compared to the ambient seawater.

Pelagic Management Units

The WPRFMC has designated EFH for pelagic species assemblages by species complex. The species complex designations for the Pelagic MUS are temperate species, tropical species, and sharks. The designation of these complexes is based on the ecological relationships among species and their preferred habitat. Guam's pelagic fisheries consist of primarily small, recreational boats. There are currently no large-scale pelagic fisheries on Guam.

The WPRFMC designated EFH from shore to a depth of 656 ft. (200 m) for eggs and larvae and a depth of 3,280 ft. (1,000 m) for juveniles and adults. Therefore EFH for all life stages falls within the area of influence of the outfall from the NDWWTP. Eggs and larvae from Pelagic MUS may not be able to avoid the zone of mixing, but juvenile and adult pelagic fish are highly mobile and are expected to move through the zone of mixing quickly and infrequently, if they pass through it at all. Pelagic species are primarily found in deep water, so the location of the outfall of the NDWWTP will be too close to shore and too shallow to be visited often by truly pelagic species.

Stormwater Management

DON will implement a comprehensive stormwater management program for the control of non-point source pollution for any of the alternatives selected from the SEIS. The program applies to the housing in the preferred alternative for personnel at Andersen Air Force Base. This program is required by law and Navy regulations. The various policy, guidance and procedural components of this program are subject to periodic updates and revisions to ensure they cover the latest regulatory requirements and technology and practices to effectively comply with all requirements.

DoD facilities are required to comply with the Program Comprehensive Construction Storm Water Pollution Prevention Plan (SWPPP) for construction, as well as individual project SWPPPs, to properly manage stormwater and non-stormwater discharges through the use of erosion and sediment control and pollution prevention measures.

DoD facilities are required to comply with the Energy Independence and Security Act, Section 438. The preferred method to comply is for projects to be a low impact development (LID). LID measures would be consistent with guidelines provided in UFC 3-210-10 and stormwater management techniques provided in the CNMI and Guam Stormwater Management Manual.

US EPA's Multi-Sector General Permit (MSGP) requires the preparation of an Industrial Activity SWPPP. The Industrial Activity SWPPP would include installation/maintenance of pollutant control measures, monitoring of stormwater at discharge outfalls, and employee training.

Training -will be given to all employees who work in areas where industrial materials or activities are exposed to stormwater, and must include spill response, good housekeeping, and material management practices. Trained and qualified facility personnel also regularly inspect all areas of a

facility where industrial materials or activities are exposed to stormwater. These measures reduce/avoid potential impacts to water resources from spills or release of other contaminants and pollutants.

Live Fire Training Range Complex (LFTRC) berms will contain native or non-invasive herbaceous vegetation, and other engineering controls. The LFTRC will also be managed in accordance with current Marine Corps range management policies and procedures described in MCO 3550.10. Range management procedures specific to the LFTRC may include, but may not be limited to engineering controls and maintaining grassy vegetation on berms, managing stormwater at ranges, restricting vehicular activities at ranges to designated/previously identified areas, and periodically removing expended rounds from the ranges (conduct range clearance). These measures would minimize impacts to soil from erosion and potential metals contamination associated with range operations, thereby reducing the potential for soil or sediments to enter nearshore waters.

Recreation and Fishing by DOD Personnel

DON acknowledges that it is the responsibility of each individual to conduct themselves in an environmentally responsible manner when engaged in professional or personal activities. One of the ways to achieve environmentally conscious behavior by all members of the DoD is to instill environmental stewardship in the culture of the organization. DON will commit in the Record of Decision for the SEIS to continuing and expanding the education and outreach efforts that have begun under the original Guam Buildup action. The goal is for every service member who comes to Guam to be aware of Guam's unique natural resources, the conservation challenges that exist, and recognize the role they play in reducing anthropogenic effects on Guam's environment. This awareness and appropriate conduct extends beyond personal activities to the locations and types of regular physical training (PT) conducted by permanently stationed active duty units and Unit Deployed Program (UDP) in Guam. To this end, it is not within the training program and policies of the USMC to conduct PT in sensitive environments such as coastal or near shore waters. Each unit assigned to Guam irrespective of duration and deployment status will institute a PT awareness and operational guidance that identifies appropriate PT areas as well as identify areas that are off-limits for such activities (e.g., Haputo Ecological Reserve) in coordination with installation and regional resource management plans.

DON Training Actions

The Marine Corps training activities described in the Mariana Islands Training and Testing (MITT) effort and the increase in the number of Marines deploying to Guam under the UDP are not linked. MITT training analysis includes a maximum amount of amphibious training and limited ground training tied to amphibious warfare-based existing training capability within the Mariana Islands. The Marine Corps units participating in MITT activities are all transient units and are necessarily linked to the DON deployment schedule for amphibious and carrier units. The UDP Marines, however, are units originating in either Hawaii or the continental United States that will rotate to Guam on a 6 month cycle, remain on Guam for 6 months and return home for at least 12

months before returning. These will be individual infantry battalions, aviation squadrons, and associated enablers. The UDP units will be land based and do not necessarily participate in the same amphibious and strike warfare training as MITT units. Even on the rare occasions when Guam rotational units might participate in a MITT amphibious exercise, these units will neither increase levels of training nor cause additional impacts beyond the training that is fully analyzed, since they would be substituting for other units included in training within the MITT. While the relocation of Marines to Guam will impact the environment in ways specifically described in the Guam SEIS, the addition of UDP units, and their associated land based training, will not increase MITT activities. The MITT is therefore not required to address these impacts because the Guam SEIS has already sufficiently reported them; however both documents include an evaluation of cumulative effects that may occur under both training regimens.

Additionally, please note that the Guam Power Authority plans to deactivate the Tanguisson power plant by May 2015, therefore, it will not be part of the network of utilities servicing the DoD bases on Guam.

My office is looking forward to arriving at a common understanding and an equitable conclusion to this consultation. My technical point of contact continues to be Dr. Sean Hanser at (808) 472-1388 or sean.hanser@navy.mil, and my overall point of contact is Mr. Randel Sablan, JGPO Environmental Director, at (671) 339-5440 or randel.sablan@fe.navy.mil. They are available to answer questions or discuss any aspect of the information supplied in this letter.

Sincerely,

J.A. CAMPBELL
By direction

Enclosure: 1. GWA Receiving Water Quality Summary Fourth Quarter 2014

Copy To:
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HQMC (I&L) (PP&O)
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DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
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April 13, 2015

Mr. Michael Tosatto
Regional Administrator
National Marine Fisheries Service
Pacific Islands Regional Office
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Honolulu, HI 96818

Dear Mr. Tosatto:

With this letter, the Department of the Navy (DON) continues informal consultation with the National Marine Fisheries Service (NMFS) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 et seq.), regarding the effects of the proposed Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation on Federally listed marine species (as addressed in the 2014 Draft Supplemental Environmental Impact Statement [SEIS]). As stated in the December 10, 2014 letter that initiated this informal consultation, the DON completed a consultation in 2010 related to the Guam and CNMI Military Relocation Environmental Impact Statement (EIS) and will continue to operate under the 2010 Biological Opinion (BO) for the listed marine species addressed under that consultation (i.e., sea turtles). However, since completion of the 2010 consultation there are species that have been recently listed under the ESA that could occur in the vicinity of the proposed action. Those species are the threatened scalloped hammerhead shark (*Sphyrna lewini*) and three species of threatened coral (*Acropora (A.) globiceps*, *A. retusa*, and *Seriatopora aculeata*).

In the December 10, 2014 letter, two separate consultation elements were defined that may have the potential to affect either the scalloped hammerhead shark or the three species of coral identified above:

a. The indirect effects of the projected increase of wastewater to the Northern District Wastewater Treatment Plant (NDWWTP), a Guam Waterworks Authority (GWA) facility, and resulting increase in treated effluent from the plant's outfall. DON has determined that this element may affect, but is not likely to adversely affect *A. globiceps*, and the scalloped hammerhead shark because the effects are insignificant. DON has determined that this element may affect, but is not likely to adversely affect *A. retusa* and *Seriatopora aculeata*, because the effects are discountable. We request your concurrence with these determinations.

b. Revisiting the 2010 consultation to consider the effects of constructing the Amphibious Vehicle Laydown Area (AVLA) in Inner Apra Harbor. The AVLA includes a vehicle ramp and a small boat ramp which are the only in-water projects not completed from the original 2010 EIS. DON has determined that the AVLA project may affect, but is not likely to adversely affect the scalloped hammerhead shark, because the effects are insignificant. The DON has determined that constructing the AVLA will have no effect on ESA-listed corals. We request your concurrence with these determinations.

Information that is additional to what was provided in DON's December 10, 2014 letter regarding the updated proposed action and associated elements and DON's rationale surrounding both consultation elements are discussed below.

CONSULTATION ELEMENT 1 – Potential Effects of Increased Wastewater Effluent

Communications from personnel from NMFS' Pacific Islands Regional Office (PIRO) clearly indicated concern that upgrading the NDWWTP to secondary treatment may not satisfactorily improve the quality of the effluent or compensate for the volume of added wastewater from personnel that are expected to move to Guam in association with the proposed action. Based on DON's communication with NMFS PIRO, we are also aware that management of crown-of-thorns-starfish (*Acanthaster planci*) (COTS) is a priority for NMFS and the species' population growth is linked to elevated nutrients in the nearshore environment.

The fiscal year (FY) 2014 National Defense Authorization Act (NDAA) directed the Secretary of Defense to convene the Economic Advisory Committee (EAC) in part to develop an implementation plan that will address public infrastructure requirements necessary to support the preferred alternative of the Guam and CNMI Military Relocation SEIS. The implementation plan will detail descriptions of work, costs, and schedules for completion of construction, improvements, and repairs to Guam public infrastructure affected by the relocation, including improvements and upgrades to the Guam wastewater system. Section 8102 of the FY 2014 Consolidated Appropriations Act (Public Law No. 113-76) appropriated $106.4 million to the Secretary of Defense, acting through the Department of Defense's (DoD) Office of Economic Adjustment (OEA), for civilian water and wastewater improvements on Guam. These funds have been recommended to be used for the upgrades to the NDWWTP and do not expire and remain available until they are expended. The DoD and U.S. Environmental Protection Agency (US EPA) have finalized the water and wastewater report for the implementation plan.

The FY 2015 NDAA continues to require the EAC to develop an implementation plan, which will include addressing the public water and waste water systems.. Part (b)(2) of Section 2821 in the FY 2015 NDAA defines public infrastructure as, *any utility, method of transportation, item of equipment, or facility under the control of a public entity or State or local government that is used by, or constructed for the benefit of, the general*

public. Upgrades to the NDWWTP are required per the Draft SEIS to meet permit requirements and are expected to be a top priority of the EAC implementation plan. Ultimately, GWA is the National Pollutant Discharge Elimination System (NPDES) permit holder and owner of the NDWWTP, so GWA will be responsible for plant operations.

US EPA's responsibility with respect to the NDWWTP is to set numeric limits for the discharge through the NPDES permitting program and provide input into the National Environmental Policy Act process required for the upgrades to the NDWWTP. Through the NPDES program, US EPA issues permits for all point source discharges in Guam. Permits are written to be protective of GWQS, Essential Fish Habitat (EFH), ESA-listed species, and in compliance with the Coastal Zone Management Act. Permits are reissued by US EPA every five (5) years.

Plans for Upgrading the NDWWTP

DON, OEA, and the EAC, have been working with staff at US EPA and GWA to plan improvements and an implementation plan for the improvements to the NDWWTP. The minimum requirements of the design for the NDWWTP upgrade include elements such that the effluent would meet the following water quality standards:

- Orthophosphate < 10 milligrams/liter (mg/L)
- Nitrate nitrogen < 40 mg/L
- Ammonia nitrogen < 4 mg/L

Additionally, the minimum requirements of the design would reduce pathogens to the limits outlined in the current NDWWTP NPDES permit through a disinfection process. This is something that is not currently performed.

Installation at the end of the outflow pipe of the 400-foot (ft) (121-meter [m]) multiport diffuser with 40 ports will be the critical element of the NDWWTP upgrade. The diffuser will further reduce the nutrient concentration levels due to the enhanced mixing zone, with a reported dilution factor of 200:1. This should facilitate compliance with the following Guam Water Quality Standards (GWQS):

- Not cause orthophosphate concentrations in the receiving water to exceed 0.05 mg/L
- Not cause nitrate-nitrogen concentrations in the receiving water to exceed 0.2 mg/L
- Not cause ammonia concentration in the receiving water to exceed 0.02 mg/L

Installation of the diffuser will be a priority during the design process and in future detailed construction scheduling. Installation of the diffuser will not be a separate action since it is currently part of the NDWWTP upgrade,

The upgraded treatment system elements have been planned to meet the discharge

limits in the current NPDES permit requirements and GWQS, including those for nutrients. DoD and US EPA have finalized a technical report on public water and wastewater recommendations for the EAC Implementation Plan with evaluation of treatment upgrades, scope, conceptual layout, estimated cost, and a proposed schedule for upgrading the NDWWTP. The report is enclosed.

The schedule in the report proposes to have the upgrades completed, and commence operation by November 2021, which is the same year projected for the first major influx of US Marines to report to Guam as part of the relocation schedule. Increases begin to approach peak levels around 2024.

The Guam Environmental Protection Agency certifies permit limits are in compliance with the GWQS under section 401 of the Clean Water Act. The upgraded NDWWTP will meet wastewater discharge in compliance with limits consistent with secondary treatment levels and GWQS, including those for nutrients in the 2013 NPDES permit. With implementation of the proposed treatment technologies, installation of the diffuser, and additional training, GWA's NDWWTP operations staff will be capable of meeting the US EPA NPDES permit requirements.

It is important to emphasize that although the proposed action would increase the flow of wastewater to the NDWWTP by about 36%, the wastewater that is flowing to the NDWWTP from the DON would not be the only wastewater to be treated. All of the wastewater from all customers linked to the NDWWTP would be treated by the upgrades to the plant. Therefore, plant improvements provide a total solution to meet or exceed water quality standards, because all effluent from NDWWTP will be in compliance with the current NPDES permit.

Effects to Water Quality from NDWWTP before the Upgrades

As stated in the December 10, 2014 letter initiating consultation, DON acknowledged that sufficiently elevated levels of nutrients in nearshore waters can increase COTS larvae survivorship and feed algal growth. DON acknowledged scientific research indicates that elevated levels of dissolved inorganic nitrogen are correlated with the severity, but not the prevalence, of coral disease in *Porites* species on the west coast of Guam (Redding et al., 2013). Part of the challenge with knowing the cause of the elevated nutrient level is the fact that there are naturally high levels of nutrients that come from the soils and flow through the aquifer of northern Guam. Matson (1993) states that nutrient levels (designated as [nitrogen oxides (NO*x*)] within a kilometer of shore are heavily influenced by water coming through the aquifer. The paper states, "The NO*x* content of upwind ocean water that floods the reef flats averages 0.27 μM (micromoles), but drops to 0.12 μM within a kilometer of shore. …at least half of the upwind coastal NO*x* must be from aquifer leakage to windward and subsequent wind-driven circulation along the shore." He goes on to state that "the aquifer increases the nutrient content of coastal oceanic waters

considerably. Even the lowest estimates of aquifer flux…at least doubles the ambient concentration daily." (Matson, 1993, p. 370).

Results reported for nitrogen levels measured in wells by McDonald (2002) confirm that nitrogen concentrations can be as high as 4-5 mg/L and that there are areas in the Finegayan, Yigo, and Agana subbasins of the aquifer that potentially contribute high or rising nitrate-nitrogen concentrations. The sources of the nitrogen include sources that are similar in nature to material handled by the NDWWTP in nature but are untreated. McDonald (2002) lists sources of nitrogen to include sources such as sewer lines, septic tank/leaching field systems, golf courses, farms, commercial and family animal husbandry locations (raising swine, fish, and chickens), pastures, and ponding basins.

The outfall from the NDWWTP lies 1,900 ft (580 m) offshore at a depth of 140 ft (42.6 m). This is within the 3,300 ft (1 kilometer [km]) zone of influence described by Matson (1993). The calculated volume of the Guam aquifer is 2.2 quadrillion gallons (8.4 billion cubic meters [m^3]) and 3.8-6.2% (84.3-137.6 billion gallons [319.2 – 520.8 million m^3]) is estimated to discharge to the ocean every day (Matson, 1993). That is an average of 6.8±4.2 m^3 per meter of coastline per day (544.4±336.2 gal/ft/day). In the 4th fiscal quarter of 2014, the NDWWTP had an average flow of 6.09 million gallons per day (MGD) and a max of 15.7 MGD (GWA, 2014). At its 4th fiscal quarter maximum, the NDWWTP is contributing flow equivalent to 0.00011-0.00019% of the volume of the aquifer per day. Additionally, Redding et al. (2013) reported nitrogen ratios that have maximum values of 8.3 parts per thousand (‰) near Tumon, and the ratios and other evidence are an indicator of "a strong influence of sewage-derived" nitrogen. Yet a study of nitrogen inputs to the nearshore waters of Maui, Hawaii, place similar ratios in their moderate range (Dailer et al., 2010). They report 6 to 8‰ as the range for coastal urbanized areas of Maui, where potential sources of nitrogen enrichment include runoff and groundwater pollution from golf course irrigation and leakage from septic tanks and cesspools. They report nitrogen ratios as high as 43.3‰ associated with being in close proximity to injection wells. Given the quantity of nitrogen-enriched water flowing daily from Guam and the variety of potential sources of nitrogen, the outflow from the NDWWTP may generate highly localized areas of elevated nutrients in the water, but the overall effect from NDWWTP effluent is expected to be swamped out by the flow from the Guam aquifer and mixing with the ambient seawater.

DON acknowledged that some dissolved compounds in the effluent from NDWWTP may have greater effect than others. These effects are expected to be localized to the environment immediately adjacent to the outfall of the NDWWTP and will be eliminated by mixing with the seawater within a few hundred meters of the outfall pipe. It is acknowledged that mixing is not facilitated as well without the diffuser than it will be when the diffuser is installed. The compound in the effluent that is of greatest concern is ammonia. US EPA does not require GWA to report the load for nitrogen, ammonia, or other nutrients in the outflow in the NPDES Permit for the NDWWTP (NPDES Permit No.GU0020141). Instead US EPA requires GWA to conduct monitoring of receiving

water in coastal waters near the NDWWTP outfall. From grab samples, GWA is required to report total Kjeldahl nitrogen, ammonia, orthophosphate, and nitrate as well as other components in the sample.

Ammonia does have deleterious effects on marine wildlife. The toxicity of ammonia to aquatic life is affected by temperature, pH, dissolved oxygen, and salinity (Bower and Bidwell, 1978; Randall and Tsui, 2002). In general, the higher the temperature and pH and the lower the levels of dissolved oxygen and salinity, the greater the ammonia toxicity. For mobile invertebrates, toxicity appears to increase as salinity decreases (Chen and Lin, 1991; Miller et al., 1990), although too few data exist to indicate whether this pattern is typical for all or most invertebrates. A number of studies indicate that ammonia toxicity is greatest to early life stages of invertebrates (for example Feyjoo et al., 2011; Liao et al., 2011; Wajsbrot et al., 1990).

Hatching and growth rates of fishes may be affected by ammonia (Eddy, 2005; Miller et al., 1990). Slightly elevated ammonia levels may cause fish to experience a reduction in hatching success; reduction in growth rate and morphological development; and injury to gill tissue (i.e., hyperplasia), liver, and kidneys (Benli et al., 2008; Eddy, 2005; Smart, 1976). In hyperplasia, the gill filaments are swollen and clumped together, reducing the fish's ability to 'breath'. These results have been shown in both fresh and marine water environments (Eddy, 2005).

Elevated ammonia levels can also lead to ammonia poisoning by suppressing normal ammonia excrement from the gills. If fish are unable to excrete this metabolic waste product, there is a rise in blood-ammonia levels resulting in damage to internal organs (Benli et al., 2008; Miller et al., 1990).

The highest levels of ammonia reported in the GWA Receiving Water Quality Summary Fourth Quarter 2014 Report at any sampling location was 0.042 mg/L (Table 1 in the December 10, 2014 DON ESA consultation letter). This level exceeds GWQS, but is below reported values for toxicity to marine species from ammonia in the literature.

When the diffuser is installed, the mixing zone will meet the following GWQS:

- The zone of mixing shall be limited to an area that will minimize impacts on uses, and where allowed, will not adversely affect the receiving water's designated uses;
- Water quality standards must be met at every point outside the mixing zone;
- Zones of passage must be allowed, and mixing zones must not encroach upon areas used for fish harvesting, particularly of stationary species;
- Biologically important areas and habitat for endangered and threatened species must be protected; and
- Mixing zones shall not cause lethal conditions to aquatic life and wildlife passing through the zone or be injurious to human health from temporary exposure.

The permit requires the mixing zone to be equal in depth to the depth of the water over the diffuser, and in length to twice the depth of the water plus the length of the diffuser, with the diffuser centered within the mixing zone. After the diffuser is installed, the mixing zone will be 140 ft (42.6 m) deep and 680 ft (207.3 m) long (NPDES Permit No.GU0020141). The mixing zone without the diffuser is expected to be larger than the mixing zone with the diffuser. As stated before, the outfall from the NDWWTP lies 1,900 ft (580 m) offshore at a depth of 140 ft (42.6 m). The pipe directs flow offshore. Effluent that would flow onshore would be due to eddies, currents, or wind waves, which would cause mixing.

The information above indicates that the current condition for the proposed action is an elevated baseline for nutrients in the nearshore water on the west coast of Guam, particularly nutrients which could potentially affect elements of EFH. The flow from the NDWWTP, which is currently treating wastewater to an enhanced primary level, could contribute very locally to a suboptimal marine environment in the vicinity of the outfall.

Effects on ESA-listed Species in the Vicinity of the NDWWTP

DON obtained data about the presence and distribution of ESA corals from NMFS in February 2015. The source of the data is David Burdick at the University of Guam (UoG). A synthesis of the information combined with DON's information about the corals is discussed below.

Figure 1 shows the distribution of ESA-listed corals around Guam from the data provided by NMFS. *A. globiceps* appears to be distributed around much of the island, while *A. retusa* and *Seriatopora aculeata* have only been observed at the south end of the island. Burdick communicated to DON in an e-mail that he conducted qualitative/semi-quantitative coral community surveys aimed at generating species lists for each site and for assessing the degree of bleaching impact for each species (Burdick, 2015). He stated that the surveys "…can only provide presence/absence information. These were roving diver surveys and I did not count the number of colonies I encountered." A copy of the e-mail from Burdick is included with this letter.

Pavona diffluens. The DON acknowledges that an e-mail from Don Hubner at PIRO on December 19, 2014, informed Naval Facilities Engineering Command, Pacific (NAVFAC PAC) that NMFS' records suggest that *Pavona diffluens* does not occur in the Marianas, and it has been removed from the species list for the archipelago. The DON has no confirmed records of *P. diffluens* in its records. This species will not be considered further in this consultation.

Acropora globiceps. The DON combined the ESA-coral data from NMFS with bathymetry data obtained from UoG. Bathymetry data for the coast of Guam is extremely limited. DON estimated, within the limits of the data, the zone in the environment in which *A. globiceps* could be found within 9,900 ft (3 km) of the NDWWTP outfall. The

distance of 9,900 ft (3 km) was judged to be a very conservative zone of influence for effects from the NDWWTP effluent. Effects from the effluent would be expected to dissipate with distance from the outfall, and greater concentration of nutrients from the NDWWTP would be expected seaward of the outfall, because the flow is directed offshore. Processes that would carry the effluent toward shore would also promote mixing with the surrounding seawater.

Suitable habitat for *A. globiceps* was defined as upper reef slopes and reef flats from 1 ft (0.3 m) down to 26 ft. (8 m). The zone is marked on Figure 2 with orange cross-hatching; it encompasses 490 acres (198 hectares [ha]). With respect to *A. globiceps* near the NDWWTP outfall, Burdick stated that "There were two sites surveyed near the [NDWWTP] outfall: one beginning on the North side of the large natural channel immediately out from the beach near the power plant and another immediately South of the water intake channel. I recorded *A. globiceps* at the site to the North of the power plant, but not at the other site. Of the 36 sites from around the island at which I conducted coral community surveys, I found *A. globiceps* at 22 of them. I would say that within a given site, *A. globiceps* is uncommonly to occasionally encountered." Figure 3 is an aerial view of the area.

To estimate the number of *A. globiceps* colonies that may be in the orange zone on Figure 2, DON derived a density using the following logic, per Burdick's, surveys, *A. globiceps* was observed on 22 out of 36 survey sites, which is 61% of sites. DON has no studies that actually report *A. globiceps* densities, but Burdick and other experts indicate that *A. humilis* is most frequently mistaken for *A. globiceps*, because it looks similar and occurs in the same environment. Scientists who worked for the consultant HDR and conducted the surveys for the previously proposed aircraft carrier wharf in Apra Harbor in 2010 identified *A. humilis* on surveys of mitigation sites and reported it occurring on 4 of 53 transects:

- 3 colonies on a transect on the west side of Orote Point; density 0.3 colonies/m^2
- 1 colony on a transect at Piti, off the point; density 0.1 colonies/m^2
- 2 colonies on a transect on the north side of Glass Breakwater; density 0.2 colonies/m^2
- 1 colony on a transect on at Adelup Point; density 0.1 colonies/m^2

Each transect was 107.6 ft^2 (10 m^2) and occurred in habitat that would have been appropriate for the occurrence of *A. globiceps*. The total of 7 colonies in 5,704.9 ft^2 (530 m^2) results in a density of 0.0012 colonies/ft^2 (0.0132 colonies/m^2), if we assume that *A. globiceps* .is evenly distributed in the environment. Within the 490 acres (198 ha) close to the NDWWTP, we would expect a high value of 26,175 colonies (1,982,961 m^2 x 0.0132 colonies/m^2 = 26,175 colonies) and a low value of 15,967 colonies if we assume it occurs in 61% of the area.

All of the *A. globiceps* colonies are expected to occur at depths shallower than 26 ft (8

m). The outflow pipe releases water at 140 ft depth (42.6 m) and is at least twice the distance from the shore that the deepest *A. globiceps* colony would occur (Figure 2). Effluent would need to be transported toward the shore, mixing along the way to affect *A. globiceps* colonies. The bathymetry that is less than 26 ft (8 m) is close to shore which would be within an area of greater concentration of nitrogen compounds along the 3,300 ft (1 km) gradient of elevated nitrogen described in Matson (1993). *A. globiceps* that persists in this area has existed in an environment of elevated nitrogen from the outflow of the Guam aquifer and any effects, however diffused, of the NDWWTP as it operates at this time. The effect of nitrogen from the NDWWTP is expected to be minimal compared to the amount coming from the island. Nitrogen coming from the aquifer is more likely to be in a form other than ammonia, so ammonia signals may be more attributable to effects from the NDWWTP. However, as was pointed out in Table 1 in the December 24, 2014 letter, ammonia levels are within the GWQS at most locations during sampling.

The genus *Acropora* is susceptible to COTS and coralivorous snail predation, but it is not known if *A. globiceps* is a preferred prey species. Presuming the species is affected significantly by COTS, the NDWWTP may contribute locally to elevated nutrient levels that would promote COTS larval survivorship. Ammonia would not be the nutrient that would support larval survival, but more bioavailable forms of nitrogen could. In that case, the nitrogen signal from the NDWWTP would be dwarfed by the quantity of bioavailable nitrogen coming from the Guam aquifer.

Based on the information provided, DON concludes that the increase of wastewater flow to the NDWWTP from the proposed action prior to upgrades in 2021 *may affect, but is not likely to adversely affect* A. globiceps*, because the effects are insignificant*. The basis for this statement is that even though somewhere between 15,967 and 26,175 colonies of *A. globiceps* are projected to occur within a 3,300 ft (3-km) radius of the NDWWTP outfall, the colonies all occur inshore of the outfall at a much shallower depth and closer to the shore where the nitrogen signal from the Guam aquifer is perpetually many orders of magnitude greater by volume than that from the NDWWTP. The NDWWTP may be a very localized source of ammonia that can be measured in the environment, but that signal is within the GWQS most of the time. Ammonia may limit invertebrate development and larval growth in the immediate vicinity of the outfall, but it is not the element that would promote COTS larval survivorship. The nitrogen from the Guam aquifer would be the far greater contributor to COTS survivorship that may affect *A. globiceps*.

Acropora retusa. As stated in the initial ESA consultation letter on December 10, 2014, the DON has no confirmed sightings of *A. retusa* around Guam. There is one record of a species recorded as *Acropora* cf. *retusa*. One colony was observed in Fouha Bay in southwestern Guam. This is generally the same part of the island where the data from Burdick (Figure 1) shows a known occurrence of *A. retusa* at the very southern tip of Guam.

The DON concludes that the increase in wastewater flow to the NDWWTP from the proposed action prior to the upgrades in 2021 *may affect, but is not likely to adversely affect* A. retusa*, because the effects are discountable*. The DON acknowledges the species could conceivably occur within a 3,300 ft (3-km) radius of the NDWWTP outfall, because this species occurs on upper reef slopes and tide pools ranging at depths of 1 to 15 ft (0.3 to 5 m). Because of the apparent rarity of the species on Guam and no known occurrences on the west coast of Guam above Apra Harbor, the possibility of colonies occurring in the zone of influence of the NDWWTP where effects from nutrient imbalance or increased COTS predation could be attributable to the NDWWTP would be discountable.

Seriatopora aculeata. As stated in the initial ESA consultation letter on December 10, 2014, the DON has no records of *Seriatopora aculeata* being observed around Guam. The data from Burdick in Figure 1 shows one known occurrence of *S. aculeata* in southwestern Guam.

The DON concludes that the increase in wastewater flow to the NDWWTP from the proposed action prior to the upgrades in 2021 *may affect, but is not likely to adversely affect* S. aculeata *because the effects are discountable*. The DON acknowledges the species could conceivably occur within a 3,300 ft (3-km) radius of the NDWWTP outfall, because this species is thought to occur across a broad range of depths—from 10 to 130 ft (3 to 40 m). Because of the apparent rarity of the species on Guam and no known occurrences on the west coast of Guam above Apra Harbor, the possibility of colonies occurring in the zone of influence of the NDWWTP where effects from nutrient imbalance or increased COTS predation could be attributable to the NDWWTP would be discountable.

Scalloped Hammerhead Shark. As stated in the initial ESA consultation letter on December 10, 2014, the DON has no data or information on the scalloped hammerhead shark occurring in the vicinity of the NDWWTP outfall. If scalloped hammerhead sharks were present, they would be expected to be adults because juveniles and pups occur within protected embayments and river estuaries (Bush, 2003; Clarke, 1971; Holland et al., 1993). Generally, there is no clear information on the occurrence of adult scalloped hammerheads around Guam, because they are observed or reported rarely. The species is known to be wide ranging, can move long distances, and is known to aggregate above seamounts (Clarke, 1971; Klimley et al., 1988).

As stated above, ammonia would be the component of the effluent that would be a greatest concern to fish. Research shows that high levels of ammonia can negatively affect fish, especially their nervous systems and brain. But a number of fish have physiological mechanisms for dealing with ammonia including converting ammonia to urea and glutamine, because fish naturally generate ammonia internally (Randall and Tsui, 2002). There is a body of literature that shows elasmobranchs convert ammonia to urea and use the urea to control osmoregulation (Fines et al., 2001; Randall and Tsui,

2002). If the scalloped hammerhead shark is found in the vicinity of the NDWWTP outfall, the main concern is that they would swim through the zone of mixing that has elevated levels of ammonia. Adult sharks would be expected to move through the area of mixing from the NDWWTP outfall relatively quickly. Exposure to sub-quality water would be expected to be for a limited period of time.

The DON has determined that the increase in wastewater flow to the NDWWTP from the proposed action prior to the upgrades in 2021 *may affect but is not likely to adversely affect the scalloped hammerhead shark, because the effects will be insignificant*. The species is expected to have a low presence in the vicinity of the NDWWTP outfall and off Guam in general. If the adults do occur near the outfall, they would be expected to pass by rather than linger in the area. Additionally, fish in general and elasmobranchs specifically have mechanisms for dealing with some increases in ammonia.

CONSULTATION ELEMENT 2 – Potential degradation of habitat for the scalloped hammerhead shark

To summarize the information provided in the initial ESA consultation letter on December 10, 2014, DON stated in the original Guam and CNMI Military Relocation EIS that the scalloped hammerhead shark occurred in Apra Harbor during seasonal spawning (January – March) at one location extending from the entrance channel to the western edge of Big Blue reef, north to Jade Shoals (a Habitat Area of Particular Concern), and easterly into Sasa Bay. Hammerhead pupping events are reported to be rare in the area. Dr. Terry Donaldson at UoG communicated to NAVFAC PAC that he has seen scalloped hammerhead sharks in the Bay, but his observations were anecdotal. The sharks could occur in the Inner Harbor, but would be expected to occur more in Sasa Bay. For scalloped hammerhead sharks, the Inner Harbor is poor habitat, especially with the human activity and high turbidity. In the Inner Harbor, the best area for the sharks is Abo Cove. Pups or juvenile sharks could conceivably be in either location but Sasa Bay is more likely because it is higher quality environment for the sharks.

Critical habitat has not been designated or proposed in Guam waters for scalloped hammerhead sharks. Therefore, construction of the AVLA would have no effect on designated critical habitat under NMFS jurisdiction.

The AVLA (included in the 2010 Record of Decision) will be implemented along Polaris Point's southern coast and east of Alpha Wharf in Inner Apra Harbor (see Figure 2.5-5 on page 2-116 of the 2010 Final EIS). The in-water construction would be two (2) new concrete ramps. One ramp would be for the purpose of allowing amphibious assault vehicles (AAVs) and small boats to enter and leave the water. The ramp would be wide enough for a single AAV to drive on it (approximately 15 ft [4.5 m]). The second ramp would be wider and would be for the purpose of allowing Landing Craft Air Cushion (LCAC) vehicles to enter and leave the water. The LCAC ramp is planned to be longer and have a gentler slope than the AAV ramp to accommodate the terrain needs of an

LCAC. This information is an expansion and clarification of the information in the consultation letter sent letter on December 10, 2014.

No pile driving would be required to construct the ramps. The plane of the ramp would likely need to be graded with heavy equipment from the shore. Any part of the ramp that must be placed underwater would be of precast sections. The ramp surface would be paved down to an elevation of 3 ft (0.91 m) below extreme low water.

Construction activity related to construction of the AVLA is expected to be performed from shore because any modification to the shoreline will occur in depths less than 3 ft (0.91 m) below extreme low water. For the area planned for the AAV and small boat ramp, the 3 ft (0.91 m) depth is less than 11 ft (3.3 m) from shore. For the area planned for the LCAC ramp, the 3 ft (0.91 m) depth is between 30 and 50 ft (9.1 and 15.2 m) from shore. The total area in water that would be affected by ramp construction is estimated to be 0.25 acres (1012 m^2). Stressors that could affect scalloped hammerhead sharks during construction or operations are:

- Physical impact from grading and placement of concrete ramp sections
- Exposure to project-related elevated noise levels
- Increase of turbidity in the water column from equipment and moving shoreline material
- Behavioral disturbance and/or displacement from project activities
- Collision with vehicles
- Loss or degradation of habitat resources

Physical impact from grading and placement of concrete ramp sections

Construction of the AVLA would use heavy equipment that will have elements that could be submerged below the waterline to depths of about 3 ft (0.91 m) or less, below extreme low water. The use of heavy equipment associated with this project has the potential to strike scalloped hammerhead sharks that occur in very near shore in the action area. Direct physical impact with equipment can have severe impacts to scalloped hammerhead sharks including death. Construction would likely only occur during daylight hours, which is beneficial because scalloped hammerhead sharks have been reported to forage more actively at night (Holland et al., 1993). Hammerhead sharks are also expected to avoid areas of human activity and anthropogenic noise.

The following Best Management Practices (BMPs) will be used to avoid direct physical impact to scalloped hammerhead sharks:

- Special attention will be given to verify that no scalloped hammerhead sharks are in the area where equipment or materials are expected to contact the substrate before that equipment may enter the water.

- If a scalloped hammerhead shark is observed within 165 ft (50 m) of the construction activities, in-water activities would cease. Work would resume if the shark leaves the area of its own accord or after 30 minutes from the last time the shark is observed.
- Concrete ramp sections that enter the water will be placed in a slow, controlled manner.
- Silt curtains will be installed in nearshore shallow water areas to control turbidity from construction. The curtains will be an added deterrent to hammerhead sharks or pups entering the construction area.

Given that the actual in-water construction activities are limited in scope, substrate disturbance only occurs at the edge of the water, construction would only happen during daylight hours, scalloped hammerhead sharks will likely avoid the project area due to the activity occurring on site, there is limited evidence that scalloped hammerhead sharks occurs in Inner Apra Harbor at all, and the BMPs reduce the potential for direct physical impact, the DON has determined that that construction and use of the two ramps for the AVLA *may affect, but is not likely to adversely affect the scalloped hammerhead shark because the impact is discountable*.

Exposure to project-related elevated noise levels

Scalloped hammerhead sharks that would swim into the inner harbor may be exposed to sound disturbance from construction and use of the two ramps for the AVLA. Large construction equipment that would generate sound would not operate in the water during the project. Instead, most noise would come from the buckets and scoops on the equipment grading and removing soil and rocks at the shoreline.

The criteria currently used by NMFS to estimate the onset of adverse effects on fish due to exposure to high intensity sounds from pile driving uses two metrics: 1) exposure to peak sound pressure level (SPLpeak) at 206 dB re 1 micropascal (μPa) for all fish; and 2) exposure to accumulated sound exposure levels (SELacc) at 187 dB re 1 $\mu Pa^2 \cdot sec$ for fish 2 grams or larger (Stadler and Woodbury, 2009). The 2-gram threshold applies here because new-born scalloped hammerhead shark pups exceed that weight.

The nature of the noise from constructing and ramp use would be a combination of continuous and punctuated noise. Sound levels from construction are expected to be less than 150 dB re 1 μPa 3.3 ft (1 m) from the source. This sound level is significantly lower than either metric applied by NMFS to pile driving. Although the predicted level of noise could cause a behavioral response and deter scalloped hammerhead sharks from using the area temporarily, it would have no physical effects on the sharks. During the operation phase, LCAC vehicles ride above the water on a cushion of air. AAVs operate with their hull and engine in the water. Both vehicles generate about the same amount of sound in the water as a moderate-sized diesel engine boat. Scalloped hammerhead sharks are

expected to share the environment with this type of sound source on a regular basis without physical effects.

The following BMPs will be used to avoid acoustic impacts to scalloped hammerhead sharks:

- Special constant vigilance for the presence of scalloped hammerhead sharks will be maintained during in-water construction.
- If a scalloped hammerhead shark is observed within 165 ft (50 m) of the construction activities, in-water activities would cease. Work would resume if the shark leaves the area of its own accord or after 30 minutes from the last time the shark is observed.

Acoustic disturbance from construction and use of the two ramps for the AVLA is expected to be non-injurious to scalloped hammerhead sharks. The most notable expected response of scalloped hammerhead sharks exposed to noise from the proposed action would be the temporary avoidance of the area. Therefore, with the implementation of the BMPs to reduce the potential for acoustic impact, DON has determined that project-related acoustic exposures *may affect, but is not likely to adversely affect the scalloped hammerhead shark because the impact is insignificant.*

Increase of turbidity in the water column from equipment and moving shoreline material

The Inner Harbor is an environment that is regularly turbid. Navy vessel operations in Inner Apra Harbor cause temporary turbidity plumes from propeller wash and re-suspension of sediment. Seasonal rainfall also contributes to turbidity. LCAC vehicles ride above the water on a cushion of air and do not stir up the substrate except in very shallow waters. AAVs operation would be similar to that analyzed for the tug and scow analyzed in the Guam Buildup EIS and described in DON's December 10, 2014 initial ESA consultation letter on. AAVs would be less impactful, though, because the tug has a much deeper draft and more powerful engines than amphibious vehicles.

If scalloped hammerhead sharks have entered the habitat in the Inner Harbor, they have experienced the turbid environment. Daily vessel traffic in Apra Harbor is normal, thus propeller wash and re-suspension of sediments would not be a new condition in the harbor. Short-term behavioral and/or physiological responses by fish (e.g., swimming away and increased heart rate) would result; however, such responses would not be expected to compromise the general health or condition of individual fish. Although individual scalloped hammerhead sharks may react differently to plumes of elevated turbidity, DON expects that any scalloped hammerhead sharks that may be present in the inner harbor would be habituated to these conditions, although some may avoid dense turbidity plumes in favor of clearer water.

The construction is expected to suspend sediment in the project area, but the US Army Corps of Engineers BMPs require DON to install silt curtains in nearshore shallow water areas to control turbidity (from Table 2.1-1 of Volume 7 of the Guam Buildup Final EIS). This BMP will limit suspended sediment to the immediate area of construction.

Based on the above information and use of BMP to control turbidity, it is expected that exposure to increased turbidity may, at most, result in the temporary avoidance of the area immediately adjacent to the construction area, with no effect on the health of the exposed individuals. DON has determined that exposure to project-related elevated turbidity *may affect, but is not likely to adversely affect the scalloped hammerhead shark because the impact is insignificant.*

Behavioral disturbance and/or displacement from project activities

Scalloped hammerhead sharks in the action area may be exposed directly to human activity and equipment operation. Construction and operations would only be during daylight hours, and that schedule is expected to avoid some interactions with scalloped hammerhead sharks because they have been reported to forage more actively at night (Holland et al., 1993). Although the proposed action has potential to disturb scalloped hammerhead sharks, the most likely effect of this interaction would be an avoidance behavior leading to the animal rapidly leaving the immediate area without injury. The BMPs outlined to alleviate physical impact and acoustic impacts will also reduce potential disturbances to scalloped hammerhead sharks. Based on the information above, DON expects that disturbances from human activity and construction would be infrequent, brief, and non-injurious. Therefore, DON has determined that behavioral effects and disturbance from project-related activities *may affect, but is not likely to adversely affect the scalloped hammerhead shark because the impact is insignificant.*

Collision with vehicles

Under the original Guam Buildup EIS, use of the ramp would be used for moving amphibious vehicles to and from a vessel for staging and maintenance. Transits between ships and the laydown area would occur between 0700 and 1900 (daylight hours). The ramps will not be for the purpose of training. Operating AAVs would present the same risk of strike as other medium sized vessels such as tug boats, which scalloped hammerhead sharks successfully avoid on a regular basis. Hammerhead sharks and pups can be expected to be mobile enough to avoid being struck by AAVs which would be moving at a relatively slow speed (less than 10 knots) when they approach the ramp. LCAC vehicles ride above the water on a cushion of air; they can stir up the waters below the vehicle, but they would not present a strike hazard to a fish in the water.

Given the above information, DON has determined that collision with AAVs and LCAC vehicles *may affect, but is not likely to adversely affect the scalloped hammerhead shark because the impact is discountable.*

Loss or degradation of habitat resources

Dr. Donalson's anecdotal information indicates scalloped hammerheads could occur in the Inner Harbor, but the habitat is poor. He also indicated that Abo Cove would be the best habitat for hammerhead pups in the Inner Harbor. The construction location is distant from Abo Cove, which is at the far southern end of the Inner Harbor. The area to be impacted provides no known significant habitat resources for scalloped hammerhead sharks. A small portion of the shoreline, a little more than 30 ft. (9 m) wide out to 3 ft (0.91 m) below extreme low water, would be affected by the project. This habitat is not typical scalloped hammerhead shark resting, pupping, or foraging area, therefore the habitat to be removed is not meaningful for the sharks.

Based on the understanding that the area to be impacted provides no known significant habitat resources for scalloped hammerhead sharks, the DON has determined that impacts from project-related loss of habitat *may affect, but is not likely to adversely affect the scalloped hammerhead shark because the impact is insignificant.*

It is important to that DON has no record of the ESA-listed corals occurring in the Inner Harbor. One of the more recent thorough surveys of Inner Harbor habitat by Smith and Shannon (2013) checked the face of X-ray Wharf, the dredge footprint in front of the wharf, and Abo Cove. None of the ESA-listed corals were observed in any of the locations surveyed. Therefore, DON has determined that that construction and use of the two ramps for the AVLA *will not affect ESA-corals.*

My office is looking forward to arriving at a common understanding and an equitable conclusion to this consultation. My technical point of contact continues to be Dr. Sean Hanser at (808) 472-1388 or sean.hanser@navy.mil, and my overall point of contact is Mr. Randel Sablan, JGPO environmental director, at (671) 339-5440 or randel.sablan@fe.navy.mil. They are available to answer questions or discuss any aspect of the information supplied in this letter.

Sincerely,

J.A. CAMPBELL
Captain, U.S. Navy
Deputy Director JGPO
By direction

Enclosures: 1. Water/Wastewater Report
2. GWA Receiving Water Quality Summary Fourth Quarter 2014
3. E-mail from David Burdick to Sean Hanser: "RE: JGPO SEIS coral distribution question"

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Captain J.A. Campbell
Department of the Navy
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April 27, 2015

Dear Captain Campbell:

The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) Pacific Islands Regional Office, Habitat Conservation Division (PIRO HCD) has reviewed the 2014 Draft Supplemental Environmental Impact Statement (SEIS) on Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation (2012 Roadmap Adjustments) and supplementary information provided by the Department of the Navy (DON) during the course of this Essential Fish Habitat (EFH) consultation. This includes the DON's March 17, 2015 letter and supporting materials. We appreciate the opportunity to provide the following comments in accordance with the Essential Fish Habitat (EFH) provision §305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 USC §1855) and National Environmental Policy Act (NEPA).

The Draft SEIS analyzed proposed changes to the Guam and CNMI Military Relocation based on the 2012 Roadmap Adjustments. The proposed changes include a reduction in force with a peak population increase of 10,000 new Guam residents instead of the 79,000 originally proposed in the 2010 Final Environmental Impact Statement and a steady state population increase of 7,400 residents. While the reduced number of new residents will reduce the impacts of the relocation significantly, it will still lead to a net increase in Guam's overall population. In addition, the character of the deployment will be different than originally described, as approximately one-third of the relocating active duty U.S. Marines would be Permanent Change of Station (PCS) personnel and approximately two-thirds would be personnel in the Unit Deployment Program (UDP). The PCS personnel would be assigned to Guam for an average period of three years and can be accompanied by dependents. The UDP personnel would be deployed to Guam for periods of

approximately six months, and would not be accompanied by dependents. As each UDP unit is deployed off-island, another unit would be rotated to Guam so the overall number of UDP personnel would remain relatively constant.

Although this reduction in force will require less infrastructure, it will still require the DON to construct and operate a cantonment (with family housing and community support facilities) of sufficient size and functional organization to accommodate the reduced and reconfigured number of U.S. Marines relocating to Guam in accordance with the 2012 Roadmap Adjustments, and a Live Fire Training Range Complex (LFTRC) that allows for simultaneous use of firing ranges to support individual skills training and related operations. The proposed action also includes the provision of on-site utilities, access roads, and related off-site infrastructure to support the proposed cantonment/family housing and LFTRC. The DON's preferred alternative in the 2014 Draft SEIS was to construct and operate the cantonment/family housing at the Naval Base Guam, Telecommunications Site at Finegayan (hereinafter "Finegayan") and the LFTRC at Northwest Field (NWF) on Andersen Air Force Base (AAFB).

During the course of the EFH consultation (September 25, 2015 call), the DON informed NMFS that its new preferred alternative for the cantonment and family housing is to construct and operate the family housing on AAFB, the main cantonment at Finegayan inside of existing footprint, and the LFTRC at NWF on AAFB. This modification avoids the disturbance of important limestone forest and groundwater recharge areas near the Haputo Ecological Reserve Area.

Magnuson-Stevens Fishery Conservation and Management Act

Pursuant to the MSA, the Secretary of Commerce, through NMFS, is responsible for the conservation and management of fishery resources found off the coasts of the United States. See 16 U.S.C. 1801 et seq. Section 1855(b)(2) of the MSA requires federal agencies to consult with NMFS, with respect to "any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat identified under this Act." The statute defines EFH as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. 1802(10). Adverse effects on EFH are defined further as "any impact that reduces the quality and/or quantity of EFH," and may include "site-specific or habitat-wide impacts, including individual, cumulative or synergistic consequences of actions." 50 C.F.R. § 600.810(a). The consultation process allows NMFS to make a determination of the project's effects on EFH and provide Conservation Recommendations to the lead agency on actions that would adversely affect such habitat. See 16 U.S.C. 1855(b)(4)(A).

Essential Fish Habitat

In the Mariana Archipelago, the marine water column from the shoreline to the Exclusive Economic Zone (EEZ) to depths of 1,000 meters (m) and the seafloor to depths of 700 m are classified as EFH. This EFH supports various life stages for the management unit species (MUS) identified under the Western Pacific Regional Fishery Management Council's Pelagic and Mariana Archipelago Fishery Ecosystem Plans (FEPs). The MUS and life stages that are found in these waters include: eggs, larvae, juveniles and adults of Coral Reef Ecosystem Management Unit Species (CRE-MUS), Bottomfish MUS (BMUS), Pelagic MUS (PMUS), and the Crustacean MUS (CMUS).

Areas designated as Habitat Area of Particular Concern (HAPC) are found within the study area and include all slopes and escarpments between 40 m – 280 m depth, the water column down to 1,000 m that lies above seamounts and banks with summits shallower than 2,000 m within the EEZ, the Orote and Haputo Ecological Reserve Areas, Guam National Wildlife Refuge at Ritidian, Jade Shoals, and Cocos Lagoon.

NMFS PIRO has identified four major categories of potential impacts to EFH associated with the activities described in the Draft SEIS: 1.) Wastewater and Nutrient Impacts from the Northern District Wastewater Treatment Plant (NDWWTP); 2.) Stormwater and Groundwater Discharge Impacts; 3.) Physical Impacts from Recreation and Training Activities; and 4.) Fishing Impacts.

Wastewater and Nutrient Impacts from the Northern District Wastewater Treatment Plant

Under the proposed alternatives in the Draft SEIS the relocation of U.S. Marines will result in a population increase of 7,400 to 10,000 new residents and a 36% increase in wastewater inflow into the NDWWTP. While smaller in scope, this long-term increase in population will place additional stress on both the currently non-compliant NDWWTP and the marine resources in the adjacent receiving waters. According to the Draft SEIS, the first 2,600 troops and dependents are scheduled to move to Guam as early as 2019 and the U.S. Marine population will increase until reaching a steady state in 2026.

The nutrient enrichment from wastewater discharges may contribute to the following impacts on adjacent reefs: 1.) increased macroalgal growth (Lapointe 1997), 2.) increased severity of coral disease (Redding et al. 2013), and 3.) increased bioerosion, particularly when coupled with ocean acidification (DeCarlo et al. 2015). Further, eutrophic conditions appear to be a primary driver for Crown of Thorns Starfish (COTS) outbreaks as they increase the species larval survivability (Brodie et al. 2005, Houk and Raubani 2010, Timmers et al. 2012). Reefs adjacent to the NDWWTP have been affected by macroalgal overgrowth and increased disease severity. COTS have also had a significant effect on Guam's reefs over the past few decades particularly in the region surrounding the NDWWTP including the Haputo Ecological Reserve Area (Colgan 1987, Bonito 2002, Caballes 2009, PIFSC 2012). Additional nutrient loading from the NDWWTP could result in even larger

population blooms of this nuisance species. These problems have been exacerbated by the increasing frequency in coral bleaching events (2006, 2007, 2013, 2014) and the lack of large herbivores on most of Guam's reefs. The impacts are expected to increase in the future due to synergistic effects with other climate change impacts including elevated sea surface temperatures and ocean acidification.

The DON acknowledges that contributing flow to the substandard NDWWTP could add to a suboptimal marine environment. DON has taken steps to secure funding to upgrade the NDWWTP to comply with the 2013 NPDES permit. As part of this effort, the DON, supporting the Office of Economic Adjustment (OEA) and the Economic Advisory Committee (EAC), has been working with US Environmental Protection Agency and Guam Waterworks Authority (GWA) staff to plan improvements and develop an implementation plan to upgrade the NDWWTP. The recent report entitled *Final Guam Water and Wastewater Assessment Repot In Support of the Economic Adjustment Committee Implementation Plan* (NAVFACPAC 2015) describes the feasible options to bring the NDWWTP into compliance with the National Pollutant Discharge Elimination System (NPDES) permit. The options include methods to achieve nutrient and pathogen reduction in addition to standard secondary treatment. It will also improve dilution through the placement of the diffuser on the outfall. If implemented, these upgrades may significantly reduce wastewater impacts. However, the upgrades will take a projected six years or more to implement and require cooperation and coordination with GWA, as well as sufficient funding for construction and implementation. The DON has stated that $106.4 million has been appropriated to fund civilian water and wastewater improvements. However, the cost estimates were redacted from the report, so it is not clear whether funding is sufficient to implement these upgrades. In addition, construction and the relocation of the first 2,600 personnel will take place prior to the completion of the upgrades.

The report did not include figures on nutrient or pathogen reduction levels to be achieved by these upgrades under Option 1. The DON states in its March 17 letter that these upgrades should facilitate compliance with the following Guam water quality standards (GWQS):

1. Not cause orthophosphate concentrations in the receiving water to exceed 0.05 milligram/liter (mg/L)
2. Not cause nitrate-nitrogen concentrations in the receiving water to exceed 0.2 mg/L
3. Not cause ammonia concentration in the receiving water to exceed 0.02 mg/L

The GWA Q4 Reports included with the March 17, 2015 letter did not include measures of nitrate, orthophosphate, or ammonia in the NDWWTP effluent. Thus, it is difficult to accurately assess the actual total reduction in nutrient loading associated with the upgrades. While compliance with the GWQS and NPDES requirements will be an improvement, it is important to note that macroalgal impacts to coral reefs have been documented at lower concentrations than the GWQS limits (Lapointe 1997).

Overall, the troop relocation, as described in the Draft SEIS, will result in impacts to EFH, including HAPC for Bottomfish MUS, due to increased discharge at the non-compliant NDWWTP, until the upgrades are completed. If the proposed upgrades meet expectations, they will reduce nutrient and pathogen concentrations in the NDWWTP effluent and should lead to an overall reduction in nutrient loading in the receiving waters. If successful, this action would reduce impacts to EFH from the NDWWTP in the long-term.

Stormwater and Groundwater Management

Stormwater and groundwater discharges into nearshore reefs may have considerable impacts on reef communities. Surface stormwater discharges have caused habitat shifts in places such as East Agana Bay and Adelup that are visible from satellite imagery. The shifts may be caused by a variety of factors including chemical pollutants, nutrients, pathogens, sediment, and freshwater. Even discharges of pure freshwater can have an impact on EFH as it changes the salinity of waters around the discharge point and can change the composition of coral, seagrass, and macroalgae communities. Such shifts are more extensive with larger or more polluted discharges. The northern half of Guam has numerous freshwater seeps that are affected by stormwater flows. These are more difficult to detect, but have similar impacts on habitats. For instance, the stormwater captured in the Harmon Sink can reach seeps in East Agana Bay and Tumon Bay in a matter of days (Moran & Jenson 2004). Seeps affect habitat through the volume of freshwater discharge and pollutants that may be carried by the freshwater including chemicals, nutrients, and pathogens.

Guam receives a relatively large amount of rainfall annually and may experience substantial rainfall events associated with tropical disturbances, storms, and typhoons. These precipitation events make effective stormwater management, particularly during construction, very difficult. While DON has a 100% containment policy, experience on Guam suggests that 100% containment is not possible in many situations. Further, there is considerable uncertainty as to the fate of stormwater diverted into sedimentation ponds or sinkholes in Northern Guam due to the highly compartmentalized and varied composition of the northern limestone plateau. Stormwater diverted to some basins can reach the nearshore environment in hours to days, while other locations may take considerably longer. These times may vary based on rainfall dynamics, groundwater level, and season. Given these potentially rapid transport times, there may be very little filtering of pollutants and nutrients making "containment" ineffective for protecting EFH. Further, the increase in impervious surfaces will increase the total volume of water and thus nutrients and pollutants discharged through nearshore seeps. The Water and Environmental Research Institute at the University of Guam has done a significant amount of work on this issue (Moran & Jenson 2004, McDonald 2002, Matson 1993), but there are still a number of gaps, particularly in our understanding of the fate of stormwater. Thus, a recommended precautionary approach is to avoid impacts to EFH. Project specific concerns follow.

Family Housing
The change of the family housing location from Finegayan to AAFB will help minimize the above described impacts by moving the housing project onto previously developed lands further inland and avoiding the clearance of limestone forest adjacent to the ocean. However, it is unclear how stormwater will be managed for the project (kept on site, diverted to a sediment pond, swales, etc.). The DON has stated that the Family Housing development will follow Low Impact Design (LID) recommendations. As long as stormwater volume does not significantly increase through this development, associated stormwater discharges should not affect new areas of EFH. However, this does not remove all concerns associated with the construction of these facilities and potential impacts from stormwater during both construction and operation.

Finegayan Cantonment
The Finegayan Cantonment is located only about a mile from the shore and the unique reef feature known as Double Reef. While this area is not limestone forest, it has not been fully developed in recent times and a significant amount of land cover will have to be cleared for this project. The cantonment will significantly increase the impervious surfaces in this area. The fate of stormwater in this area is not well understood, but it is plausible that it may affect nearshore reefs such as Double Reef and Haputo through seeps. In addition, without careful project planning and implementation, stormwater can affect nearshore reefs due to overland flow. (While this sounds improbable, NMFS documented flooding and erosion during runway construction at the Guam International Airport that reached East Agana Bay during a heavy rain event.) Overland flow and erosion along the cliff adjacent to Double Reef has been documented in recent times and could be exacerbated if runoff from this development reaches the cliffline. This area does not have natural surface flow contamination into the ocean. Therefore, DON efforts to minimize erosion needs to ensure that particulates and increased sheet flow do not directly discharge into the marine waters.

Northwest LFTRC
The Northwest Field LFTRC site is also located a relatively short distance from the coast. The area is currently forested and a significant amount of land cover that will have to be cleared for this project. This will be a significant change in the land use and may result in significant changes to groundwater recharge and discharge on adjacent reefs. The DON has stated that it will vegetate the berms and take other steps to minimize erosion and contamination potential at the site. This area does not have natural surface flow contamination into the ocean and therefore DON efforts to minimize erosion needs to ensure that particulates and increased sheet flow do not directly discharge into the marine waters. NMFS remains concerned about potential overland flow during construction (see Finegayan Cantonment section) for such large land clearing projects.

NMFS is also concerned that chemicals, particularly heavy metals (including lead, antimony, and copper), from the firing range activities may leach into groundwater that could eventually reach seeps in the adjacent reefs (Tanskanen et al. 1991). A recent remedial investigation of the Orote Point Rifle and Pistol Range, Naval Base Guam, found exceedances of lead, antimony, and copper

screening criteria with the highest concentrations found close to and centered on the backstop berm, up to 55 pounds of lead bullets per cubic foot in the top foot of soil backstop berm and identified potentially unacceptable risk to both humans and ecological receptors (DON 2014).

In summary, construction and operation of the Finegayan Cantonment and Northwest Field LFTRC will significantly change land use cover by decreasing forested area and significantly increasing impervious surfaces at the Finegayan Cantonment site. The construction phase of the Family Housing, Finegayan Cantonment, and Northwest Field LFTRC will also require large scale land clearing. The groundwater connections in these areas are not well understood, and there are data from other areas in Northern Guam that raise concern about coastal discharge of stormwater from these sites to EFH at nearshore sites. Given these factors, NMFS finds that construction and operation of these facilities will likely have adverse effects to EFH and the HAPCs at Haputo Ecological Reserve Area and Ritidian Guam National Wildlife Refuge.

Physical Impacts from Recreation and Training

EFH, particularly corals, seagrasses, and mangroves, can be impacted by non-construction physical impacts linked to recreation and training activities. Most physical impacts can be avoided, but this requires users to have a certain level of knowledge, responsibility, restrictions on damaging activities, and sometimes assistance to remove barriers that prevent correct action (for example, installing mooring buoys to prevent anchor damage).

Examples of existing or past recreational impacts include diver damage to corals at GabGab Beach and GabGab II on the Navy Base, particularly around weights used for tying off dive buoys and fish feeding stations at GabGab II. Other impacts include "reef graffiti" from a visiting sailor at Hap's Reef (Burdick et al. 2008); partial mortality, breakage, and disease linked to snorkeler contact at Ypao Beach Park; seagrass trampling and coral mortality from diver contact at Piti Bomb Holes Marine Preserve; and anchor damage from fishing and diving vessels [commercial, personal, and Morale, Welfare, and Recreation (MWR)]. These impacts are widespread and caused by civilian, military, and tourists alike. Most impacts are avoidable, but recreational users either don't know how or do not care to avoid them. Due to the rotational nature of the UDP units, education and outreach efforts to support proper behavior and environmental stewardship will need to increase significantly. Based on experience, traditional pamphlet or sign campaigns are unlikely to result in significant behavioral change.

Training activities can also impact EFH. The DON's March 17 letter states that the Marine Corps training activities described in the Mariana Islands Training and Testing (MITT) effort and the increase in the number of Marines deploying to Guam under the UDP are not linked. The DON further states that the Marine Corps units participating in MITT activities are all transient units and are necessarily linked to the DON deployment schedule for amphibious and carrier units. The UDP Marines, however, are units originating in either Hawaii or the continental United States that will

rotate to Guam on a six- month cycle, remain on Guam for six months and return home for at least 12 months before returning to Guam. These will be individual infantry battalions, aviation squadrons, and associated enablers. The UDP units will be land-based and do not necessarily participate in the same amphibious and strike warfare training as the MITT units.
Although the total number of troops on Guam at any given time will be lower under the Draft SEIS, there will be more turnover among those troops. Most of these troops will be unfamiliar with coral reef environments and the potential damage that their actions may cause. There is already insufficient capacity to educate incoming military members and their dependents on natural resource protection, and the rotations described in the Draft SEIS will increase the frequency of new arrivals. This in turn is likely to increase recreational impacts unless outreach and education efforts improve. The DON has stated that it will commit in the Record of Decision for the Final SEIS to continuing and expanding the education and outreach efforts that have begun under the original Guam Buildup action. The goal is for every service member who comes to Guam to be aware of Guam's unique natural resources, the conservation challenges that exist, and recognize the role they play in reducing anthropogenic effects on Guam's environment. Each unit assigned to Guam irrespective of duration and deployment status will institute a Personal Training (PT) awareness and operational guidance that identifies appropriate PT areas as well as identify areas that are off-limits for such activities (e.g., Haputo Ecological Reserve Area) in coordination with installation and regional resource management plans.

Fishing Impacts

Fishing is a common recreational activity on Guam. Increased nearshore fishing will result in removal of reef fishes (Hensely and Sherwood 1993, Grigg and Birkeland 1997), including grazing reef fishes, which has been documented to negatively affect coral reef communities by releasing fish grazing pressure on algae, promoting algal competition with corals (Hughes 1994, Hughes et al. 2007). The threat of algal competition with coral is exacerbated by increased nutrients in coastal waters promoting algal growth from land based sources (Smith et al. 1981, Fabricius 2005). Increased recreational fishing activities will cause additional damage to coral reef EFH and fish populations from reduction in reef structural complexity resulting from fin-kicking, fishing, anchoring, outboard props, and jet skiing (Bruckner and Bruckner 2003).

EFH Conservation Recommendations

NMFS PIRO finds that the proposed activities **Would Adversely Affect EFH**. As such, we offer the following Conservation Recommendations in accordance with the EFH provision of the MSA (50 C.F.R. § 600.905 – 930) to avoid and minimize these impacts to EFH:

1. The DON should commit to do everything in its power to ensure that the NDWWTP is upgraded to meet Guam Water Quality Standards (GWQS) as discussed in its March 17, 2015 letter. The relevant GWQS are:

    - Not cause orthophosphate concentrations in the receiving water to exceed 0.05 milligram/liter (mg/L)
    - Not cause nitrate-nitrogen concentrations in the receiving water to exceed 0.2 mg/L.
    - Not cause ammonia concentration in the receiving water to exceed 0.02 mg/L

    Further, the DON should encourage GWA to reduce nutrient levels even further as the GWQS are still above recommended levels of nitrate and orthophosphate discharges for coral reef habitats.

2. The DON should, to the greatest extent practicable, minimize stormwater runoff and prevent increases in the amount of water discharged through freshwater seeps into nearshore coastal waters. Project specific recommendations include:

    a. *Family Housing* – As this is a re-development of an existing housing area, NMFS recommends that the Navy design the construction and operation to maintain stormwater discharges into sediment basins and other catchments at no more than the current level. As long as volume does not significantly increase through this development, stormwater discharges should not affect new areas of EFH. The DON should develop outreach and training to personnel and dependents to minimize water use in households and on DON property that may result in additional wastewater and/or stormwater. Additionally, these efforts should also focus on minimizing potential pollutants that become entrained in sheet flow and ground water.

    b. *Finegayan Cantonment* - NMFS recommends that the DON phase land clearing and maximize stormwater containment actions during the construction of the cantonment to avoid impacts to EFH. NMFS further recommends that DON examine the potential fate of stormwater discharges to determine whether they may affect nearshore reefs such as Double Reef and Haputo through overland flow or seeps. NMFS recommends that any transport be minimized and slowed to the greatest extent practicable. This may involve implementing actions such as minimizing impervious surfaces, diverting stormwater into a number of smaller swales rather than channeling flows into a single basin, use of water catchment and reuse strategies, using green roofs, or other low impact design features. DON should also develop outreach and training to personnel to minimize water use on DON property that may result in additional wastewater and/or stormwater. Additionally, these efforts should

focus on minimizing potential pollutants that become entrained in sheet flow and ground water.

c. *Northwest Field LFTRC* - NMFS recommends that the DON phase land clearing and maximize stormwater containment actions during the construction of the LFTRC to avoid impacts to EFH. We further recommend that the DON examine the potential connections to groundwater flow that may affect nearshore reefs such as Jinapson and the Ritidian HAPC. NMFS recommends that discharge to these areas be minimized and slowed to the greatest extent practicable. This may involve implementing actions such as minimizing impervious surfaces, diverting stormwater into a number of smaller swales rather than channeling flows into a single basin, regular clearing of expended rounds and contaminated soil, using green roofs, or other low impact design features.

3. The DON should further examine the fate of stormwater for these projects, particularly the Finegayan Cantonment and the LFTRC, to determine whether stormwater practices affect sensitive nearshore reefs such as the HAPCs at Haputo Ecological Reserve Area and Ritidian Guam National Wildlife Refuge through seeps. NMFS recommends that any additional discharges resulting from this action, be minimized and slowed to the greatest extent practicable. This may include minimizing impervious surfaces, diverting stormwater into a number of smaller swales rather than channeling it into a single basin, using green roofs, or other low impact design features.

4. The Record of Decision for the Final SEIS should clearly identify funding and provide minimum guidelines for programs to minimize impacts from training, recreation, and fishing activities for US Marine Corps personnel. Ideally, these programs should instill a sense of environmental stewardship in personnel. The programs should not simply be a presentation, signs, or a brochure as these methods lack effectiveness. It is important to include performance metrics and adaptive management capacity to ensure that the education and outreach program is effective.

5. Ensure that each unit assigned to Guam irrespective of duration and deployment status will institute a PT awareness and operational guidance that identifies appropriate PT areas as well as identify areas that are off-limits for such activities (e.g., Haputo Ecological Reserve Area, Limestone Forest, and Reef Flats) in coordination with installation and regional resource management plans.

6. Develop methods to minimize fishing impacts by reducing take of fish species from key functional groups and rare species. This could include a ban for Department of Defense personnel on use of destructive methods of fishing such as scuba spearfishing, night time

spear fishing with lights, and gill nets, as well as bans on species of local concern such as *Cheilinus undulatus* and *Bolbometopon muricatum*,.

7. The DON should provide a commitment to develop and implement a detailed and comprehensive Adaptive Management Plan that defines watershed management and erosion control mechanisms that will be adopted based on current best available information (e.g., Guam's proposed storm water management guidelines) and involves a protocol articulating the framework for: a) documenting gaps, problems, and resource needs associated with action related project and activity effects to EFH from land based pollution (from construction, waste water treatment, use of utilities, and solid waste disposal) and overfishing; b) filling the identified information/data gaps by conducting assessment and monitoring studies that characterize and quantify the amounts of pollution (via for example dye trace studies and mapping freshwater seeps); the residence time of pollutants in near shore areas; the frequencies of major pollution events; and the physical, hydrodynamic spatial and biological properties of nearshore areas; c) incorporating these findings to update the existing management plan by researching, identifying and implementing cutting edge engineering/management measures that will reduce the sources and levels of pollution, focusing at sources with greatest impacts to EFH; and d) assessing and mitigating cumulative impacts.

Please be advised that regulations (Section 305(b)(4)(B) of the MSA) to implement the EFH provisions of the MSA require that Federal action agencies provide a written response to this letter within 30 days of its receipt and at least 10 days prior to final approval of the action. A preliminary response is acceptable if final action cannot be completed within 30 days. The final response must include a description of measures to be required to avoid, mitigate, or offset the adverse impacts of the activity. If the response is inconsistent with our EFH Conservation Recommendations, an explanation of the reason for not implementing the recommendations must be provided.

Conclusion

In conclusion, NMFS greatly appreciates the DON's efforts to effectively coordinate with us on our review of the 2014 Draft SEIS on Guam and CNMI Military Relocation (2012 Roadmap Adjustments) and the DON's efforts to minimize adverse effect to EFH including coral reef resources for this large scale project. However, the information provided in the Draft SEIS suggests that there may be significant impacts to marine resources, particularly EFH, associated with this action as currently described. We determine that adverse affect to EFH can be avoided and minimized provided the EFH Conservation Recommendations as listed above are implemented.

We greatly appreciate the opportunity to review and comment on this project. Should you have any questions, comments, or require additional technical assistance, please contact Valerie Brown in our Guam Field Office valerie.brown@noaa.gov or 671-646-1904.

Sincerely,

Gerry Davis
Assistant Regional Administrator
Habitat Conservation Division

cc by e-mail:
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MAY 18 2015

Captain J.A. Campbell
Department of the Navy, Office of the Assistant Secretary
(Energy, Installations, and Environment)
1000 Navy Pentagon
Washington, DC 20350-1000

Dear Captain Campbell:

This letter responds to your April 13, 2015 letter requesting to continue informal consultation under section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 *et seq.*), for the proposed Guam and Commonwealth of the Northern Marianas Islands (CNMI) Military Relocation (2012 Roadmap Adjustments).

Consultation History: On August 25, 2010, the Navy completed formal consultation with NMFS for the proposed Guam and CNMI Military Relocation (Original Proposed Action). That action is described in detail in the Navy's March 12, 2010 biological assessment (BA) (USN 2010a), additional information provided on April 14, 2010 (USN 2010b), the July 2010 Final Environmental Impact Statement/Overseas Environmental Impact Statement (FEIS/OEIS, USN 2010c), and is summarized in the NMFS biological opinion (NMFS 2010). The Original Proposed Action included three primary components: 1) Relocating US Marines from Okinawa to Guam; 2) Increasing and upgrading vessel berthing and related facilities in Apra Harbor to accommodate increased visits by Carrier Strike Groups (CSG) and Amphibious Taskforce (ATF) ships; and 3) Stationing an Army Air and Missile Defense Task Force on Guam. It also included substantial new upland construction and infrastructure improvements to support the incoming Marine and Army forces.

In addition to the proposed development projects, the action would have resulted in an increased human population on Guam; consisting of military personnel, civilian military support personnel, off-island construction workers, and the dependents that would accompany those three groups. The inflow of additional population was to begin in 2010, peak at about 79,000 in 2014 during the height of construction, then decrease as construction wound down and off-island workers left, and finally stabilize at about 34,000 additional people in 2019. In the 2010 consultation, the Navy determined that the proposed action would be likely to adversely affect green and hawksbill sea turtles, and not likely to adversely affect any other ESA-listed marine species under NMFS jurisdiction. The NMFS biological opinion for the proposed action considered all ESA-listed species and designated critical habitats in the Marianas and under our jurisdiction at

the time, and concluded that the Original Proposed Action would not jeopardize green and hawksbill sea turtles, would have no effect on designated critical habitat under our jurisdiction; and concurred with the Navy's not-likely-to-adversely-affect determination for the remaining ESA-listed marine species under our jurisdiction (NMFS 2010).

On October 11, 2012, the Navy issued a notice of intent to modify the Original Proposed Action and issue a Supplemental EIS (SEIS) to address actions that would be materially changed from those originally considered. The executive summary of the Draft Supplemental EIS (DSEIS, USN 2014a) describes the main factors that motivated the modifications. Significant among them were the "2012 Roadmap Adjustments," announced in the April 27, 2012 joint decision by the U.S.-Japan Security Consultative Committee, wherein the Department of Defense (DoD) adopted a new force posture in the Pacific, providing for a materially smaller and reconfigured force on Guam.

In addition to the 2012 Roadmap Adjustments, marine species that were not considered in the original consultation, but may be affected by both the Original and the SEIS Proposed Action, were recently listed under the ESA. On July 3, 2014, the Indo-West Pacific Distinct Population Segment (DPS) of scalloped hammerhead sharks (*Sphyrna lewini*) became listed as threatened (79 FR 38213), as did the corals *Acropora globiceps, Acropora retusa,* and *Seriatopora aculeata* on September 10, 2014, (79 FR 53852). Because the proposed action has materially changed and species that may be affected have been newly listed, both the Navy and NMFS believe that the threshold to re-initiate consultation under the ESA has been reached.

Based on the information provided in the DSEIS and the 2014 and 2015 consultation requests (USN 2014b & 2015), most of the originally planned in-water work is done or has been removed from the project schedule. As described below, the remaining in-water work is identical to that analyzed in the original consultation, and the project components that have changed are all upland actions that have been reduced in scale and/or relocated such that their impacts would be materially reduced as compared to the Original Proposed Action. The Navy has committed to apply all conditions and best management practices (BMP) agreed upon during the 2010 consultation, along with any additional conditions that may result from this consultation, for the duration of the SEIS Proposed Action. The 2010 protective measures included requirements to maintain constant vigilance for the presence of ESA-listed marine species during all aspects of the proposed action, to postpone or halt in-water work when protected species [corals excepted] are within 50 yards of the work, to maintain safe standoff from protected species during vessel transits, to properly install and maintain silt curtains and erosion controls, and to minimize the introduction of pollutants into the marine environment.

Therefore, the Navy has determined that the SEIS Proposed Action would cause no new or increased impacts on any of the species considered in the original consultation, and that the 2010 biological opinion remains valid for those species. Because the Navy believes that scalloped hammerhead sharks and the corals *Acropora globiceps, Acropora retusa,* and *Seriatopora aculeata* may be affected by the SEIS Proposed Action, but are not likely to be adversely affected, they have requested to initiate informal consultation for those species. NMFS agrees that the 2010 biological opinion remains valid for the species considered in the original consultation, and that this consultation will address the potential impacts of the SEIS Proposed

Action on scalloped hammerhead sharks and the corals *Acropora globiceps, Acropora retusa,* and *Seriatopora aculeata.*

Proposed Action: In the SEIS Proposed Action, the planned carrier berth and the deployment of the Army Air and Missile Defense Task Force are no longer proposed. The timeline for relocation of the marines has been pushed back, the number of marines to be relocated has been reduced by 64%, and the timeline for construction has been slowed (USN 2014a). Remaining SEIS project-related construction work is expected to begin in 2015, ramp up over two years and then enter an extended period of steady construction activity from 2017 through 2023. Construction would taper off from 2024 until its end in 2027.

The SEIS components that have changed since 2010 are all upland actions that would provide support and infrastructure for the new personnel and their missions. The revised actions are based on the reduced force structure, and would result in a reduction, and in some cases, relocation of the required housing and cantonment, and relocation of a proposed live fire training range complex (LFTRC). The over-all effect of the changes would be to reduce the action's footprint, and reduce newly disturbed upland habitats required to meet project needs.

The LFTRC is the only upland component that may have direct effects on the marine environment. The LFTRC would be constructed at the north end of the island, with the firing ranges oriented seaward, and the surface danger zone (SDZ) extending about 4,500 yards over marine waters north-northeast of Ritidian Point. The SDZ is the area to the side and beyond the end of a firing range within which misfired rounds and ricochets could land. Construction work is not expected to directly affect ESA-listed marine species. However, training at the LFTRC would include military personnel shooting 9 mm pistols; 5.54 mm rifles; and 7.62 mm, .50 caliber (12.7 mm), and 40 mm machineguns at downrange targets with dirt berm backstops rising above and behind the targets. Low numbers of projectiles fired from those weapons may land in marine waters. Hand grenades and various sized explosive charges may also be detonated at specific sites within the LFTRC or other ranges, but the effects of those detonations, including shrapnel, is expected to remain on land.

The Navy expects that most direct and indirect population increase on Guam would affect the Northern District Wastewater Treatment Plant (NDWTP) at Tanguisson. Starting in 2015, the action would begin to increase the on-island population. That would gradually increase wastewater inflow at the NDWTP until it reaches a peak of about 36% above current flows in 2023. The NDWTP is out of compliance with its USEPA National Pollution Discharge Elimination System (NPDES) permit. It provides primary treatment, vice secondary, and the outfall has no diffuser. Therefore, the revised action includes a commitment by the Navy to support efforts to bring the NDWTP into compliance with its NPDES permit, and to facilitate compliance with the Guam Water Quality Standards (GWQS) of not causing concentrations in the receiving waters to exceed: 0.05 milligram/liter (mg/L) for orthophosphate, 0.2 mg/L for nitrate-nitrogen, and 0.02 mg/L for ammonia. The minimum design requirements for the NDWTP upgrade would include: 1) installation of the 400 foot multiport diffuser; 2) processes to ensure effluent concentrations of: < 10 milligram/liter (mg/L) for orthophosphate, < 40 mg/L for nitrate-nitrogen, and < 4 mg/L for ammonia; and 3) disinfection processes to reduce pathogens (USN 2015a). It is expected to take 6 years or more to implement the needed upgrades at the

NDWTP. Bringing the NDWTP into compliance would include upland work to upgrade the treatment system from primary to secondary treatment, and in-water work to install the multiport diffuser that was fabricated for the existing outfall, but was never installed. Informal consultation was completed between the US Army Corps of Engineers and NMFS on June 26, 2007 (NMFS 2007) for the Corps' authorization for the installation of the existing outfall and as yet uninstalled diffuser (POH-2006-082). Neither SEIS nor the Navy's consultation request described the in-water work that would be required to install the diffuser. However, the Guam Water Authority (GWA) completed an environmental assessment (EA) as part of the 2007 consultation for the installation of the existing outfall (GWA 2007). The information below was taken from the project description in the GWA EA, with the expectation that it would be representative of the work that would be done for this action.

The existing outfall consists of a 34-inch diameter high-density polyethylene (HDPE) pipe that protrudes from the seafloor at about 140 feet below mean lower low water (MLLW), about 1,900 feet off shore, where the substrate transitions from hard substrate to sand. The diffuser consists of four 100-foot long HDPE pipe segments, with 10 vertically mounted 6-inch check valves each. The final segment terminates with a 20-inch check valve installed in line with the pipe. Divers would install and anchor the diffuser, aligned to the north-northeast along the 140-foot depth contour, using 36 two-piece concrete pedestal weights. Using a 4-point anchoring system, a service vessel and barge would anchor close to the end of the outfall to support dive operations and to lower parts and equipment to the divers. Small boats would be used to ferry supplies and personnel, and to remove trash and wastes for the support vessels while at anchor.

The unchanged components of the action include the planned Apra Harbor improvements, with the exception of the carrier pier that was not begun, and has been removed from the proposed action. Those actions are described in the 2010 FEIS/OEIS (USN 2010c). Construction of the proposed Amphibious Vehicle Laydown Area (AVLA) at Polaris Point is the only Apra Harbor improvement project that remains to be completed. In summary, construction of the AVLA would consist of the operation of land-based heavy equipment that would grade the shoreline and create two concrete ramps that would be used to launch and recover amphibious landing craft and small boats. The action also includes the construction of a concrete laydown area for the amphibious landing craft, concrete buildings, parking areas, and typical infrastructure such as power and water lines, with fencing and security lighting around the perimeter. The ramps would extend from the shore at about 2 feet above maximum high water, and extend outward to a depth of about 3 feet below maximum low water. The amphibious assault vehicle (AAV) ramp would be about 15 feet wide, 11 feet long, and have a slope of about 12° to 15°. The landing craft, air cushion (LCAC) ramp would have a slope of about 2°, be about 66 feet wide, and about 50 feet long. All concrete installed below the water would consist of precast slabs that would be carefully lowered into place.

Action Area: The Action Area for this consultation consists of three distinct areas. The first area consists of the portion of the LFTRC SDZ that extends about 4,500 yards over marine waters north-northeast of Ritidian Point. The second area includes the marine waters of western Guam where the wastewater effluent from the NDWTP would be discharged, the in-water area about 100 yards around the vessels that would transit to and from the outfall site during installation of the diffuser, and the down-current extent of any plumes that may result from mobilized

sediments or discharges of wastes or toxic chemicals such as fuels and/or lubricants associated with the machinery used for this activity. The third includes the marine waters of Inner Apra Harbor within about 50 yards of the work done to construct the AVLA, and the down-current extent of any plumes that may result from mobilized sediments or discharges of wastes or toxic chemicals such as fuels and/or lubricants associated with the machinery used for this activity.

Listed Species: As discussed above in the consultation history, this consultation is concerned only with the potential effects of the proposed action on scalloped hammerhead sharks – Indo-West Pacific DPS (*Sphyrna lewini*) and the corals *Acropora globiceps, Acropora retusa,* and *Seriatopora aculeata*. All other listed species under NMFS jurisdiction that may be affected by the proposed action were considered in the original consultation, which remains in effect for those species. Detailed information to describe the biology, habitat, and conservation status the scalloped hammerhead shark and the corals can be found in the sources at: http://www.nmfs.noaa.gov/pr/species/fish/scallopedhammerheadshark.htm and http://www.fisheries.noaa.gov/pr/species/invertebrates/corals.htm, respectively.

Critical Habitat: No critical habitat has been designated or proposed within or adjacent to the action area for any listed marine species under NMFS jurisdiction. Therefore, the Navy has determined that the proposed action would have no effect on designated or proposed critical habitat (USN 2015a).

Analysis of Effects: In order to determine that a proposed action is not likely to adversely affect listed species, NMFS must find that the effects of the proposed action are expected to be insignificant, discountable, or beneficial as defined in the joint USFWS-NMFS Endangered Species Consultation Handbook: (1) insignificant effects relate to the size of the impact and should never reach the scale where take occurs; (2) discountable effects are those that are extremely unlikely to occur; and (3) beneficial effects are positive effects without any adverse effects (USFWS & NMFS 1998).

Projectiles landing in the marine portion of the LFTRC SDZ: The Navy's ESA consultation requests did not address potential impacts of this stressor on scalloped hammerhead sharks or the 3 corals considered in this consultation. However, NMFS believes this stressor may affect those species. It is uncertain if the reduced force presence described in the SEIS would reduce the number of rounds fired at the range. Therefore, for the purposes of this assessment NMFS assumes that range training would remain at the levels expected for the larger force presence.

The 2010 EIS/OEIS predicted a combined total of about 10,135,000 rounds would be expended at the range annually. Based on an Army study cited in the 2010 EIS/OEIS, between 0.001% and 0.00001% of the expended rounds (1 to 101) could be expected to fall beyond the range annually, with the highest concentration landing just beyond the range backstop. To be conservative, the Navy multiplied the higher of the two values by 10 to estimate that an annual maximum of [1,014] rounds could land in the SDZ beyond the range (USN 2010c). Based on 52 5-day weeks of shooting, less than 4 rounds per day would land in the SDZ. Based on the location of the range, and on the understanding that the highest concentration of rounds landing beyond the range would be just beyond the backstop, NMFS believes that the number of rounds that would fall into marine waters would be a small fraction of the 1,014 total.

Based on the low number of rounds expected to hit the water (< 4 / day), the expectation that the rounds that enter the water would be widely and randomly scattered both temporally and spatially across the marine portion of the SDZ, the low densities and scattered distributions of the ESA-listed species considered in the consultation, and the tendency for those species to spend all, or the majority of the time below the surface, NMFS considers it discountable that any individual of the species considered in this consultation would be struck by a falling projectile at or below the surface. Additionally, the rounds that hit the water would lose the majority of their energy within a few inches of the surface. Most would settle to the bottom with about the same kinetic energy as if they had been hand-dropped at the surface. Based on that and the small size of the rounds, NMFS considers it discountable that the impact of a sinking projectile would have a measurable effect on an ESA-listed marine animal below the surface, including corals, should it be struck. Further, based on the low number of rounds that may enter marine waters, and the low solubility of projectile constituents (predominantly copper and lead), the effect on water quality from those rounds would be virtually undetectable and therefore insignificant. Because exposure to projectiles would be discountable and that the effect of an exposure, should one occur, would most likely be insignificant, NMFS has determined that this stressor is not likely to adversely affect any of the ESA-listed species considered in this consultation.

Wastewater Impacts from the NDWTP: In the Navy's ESA consultation request, they determined that exposure to action-related increased effluent discharge from the NDWTP would have insignificant effects on scalloped hammerhead sharks and on the coral *Acropora globiceps*, and that exposure to the effluent would be discountable for the corals *Acropora retusa,* and *Seriatopora aculeata*. The best available information about the distribution of *Acropora retusa* and *Seriatopora aculeata* suggests that neither species occurs near the zone of potential effect from the NDWTP. Therefore NMFS concurs that it is discountable that those corals would be exposed to stressors related to this component. The Navy based their determination of insignificance on the belief that at the current level of treatment, the effluent from the NDWTP, including the action-related additional flows, would introduce an insignificant proportion of the total nutrient loading within its area of influence. Further, by 2021, the planned upgrades would improve the treatment of all incoming wastewater at the NDWTP (existing civilian and DoD plus additional DoD) such that the effluent would not only yield no increased nutrient loading over current levels, it would meet GWQS and comply with the NPDES permit for the plant.

As stated in the description of the proposed action, the SEIS proposed action would begin increasing the human population on Guam in 2015. The increase would peak at about 9,700 above the current population in 2023, then decrease as off-island workers leave the island, to stabilize at about 7,400 additional people by 2027. Most of the action-related increased wastewater is expected to be treated at the NDWTP and discharged through the outfall, at a depth of 140 feet, about 1,900 feet off the west shore of Guam, near Tanguisson. The current average effluent discharge from the NDWTP is about 6.1 million gallons daily (MGd) (USN 2015a), which is slightly up from the 5.7 MGd reported in the original EIS/OEIS (USN 2010c). At its 2023 peak, the increased discharge would be about 36% above current levels (2.2 MGd) for a total discharge of 8.3 MGd.

Currently, the NDWTP provides primary treatment only, and no diffuser has been installed on the outfall. The Navy has committed to support efforts to bring the NDWTP into compliance

with its NPDES permit. The Navy states that installation of the diffuser is critical and its installation "will be a priority." The Navy also reports that $106.4 million has been appropriated to fund civilian water and wastewater improvements on Guam, and the *Final Guam Water and Wastewater Assessment Report in Support of the Economic Adjustment Committee Implementation Plan* (USN 2015b) describes feasible options to bring the NDWTP into compliance. However, the cost estimates to implement the suggested upgrades were redacted from the report, so it is uncertain if the appropriated funds are sufficient. Also, the needed upgrades would take about 6 years to complete. 2021 would be the soonest that would be complete.

Increased discharges would begin as early as 2015 as additional people begin arriving, and the number of additional people on the island would be up to about 9,600 by 2021 (USN 2014a); 99% of the peak of 9,700 expected in 2023. Effectively, peak discharge levels would be reached before the planned upgrades could be made. Therefore, the assessment below assumes the effluent would receive its current primary treatment. However, the diffuser has already been fabricated and could be installed relatively quickly. Additionally, the Navy has stated that the installation of the 400-foot multi-port diffuser, with its expected initial dilution factor of 300:1 within a mixing zone (140 feet deep and 680 feet long above and to the sides around the length of the diffuser) is part of the proposed action, and that its installation is a "priority". Therefore, NMFS expects that the Navy will insure that the diffuser would be installed as soon as possible, no later than the end of calendar year 2017, before effluent flows would increase to 50% of the maximum. The assessment below is based on that expectation, and on the concentrations presented in the 2010 EIS/OEIS, which were also based on the expected installation of the 400-foot multi-port diffuser. Any failure to install the diffuser before the end of calendar year 2017 would constitute a modification of the proposed action considered in this consultation, and as such would trigger the need to reinitiate consultation.

Ammonia is an effluent component that is toxic to fish and marine invertebrates. The LC_{50} 96 (lethal concentration for 50% for a 96 hour exposure) for marine fish is between 0.09 and 3.35 mg/L. The ammonia concentration in the primary-treated effluent is reported at about 18.4 mg/L (USN 2010c). However, potentially harmful concentrations are expected to be restricted to a small area well within the mixing zone, above the diffuser. Ammonia is expected to dilute to about 0.031 mg/L at the outer boundary of the mixing zone, and decrease with distance. The GWA reported ammonia concentrations as high as 0.013 mg/L at a shoreline sampling station and 0.042 mg/L at an off shore sampling station during July – September 2014 (cited in USN 2014b). Therefore, the concentrations outside of the mixing zone are well below the LC_{50} 96, as well as below concentrations at which marine aquarists become concerned; 0.10 to 0.25 mg/L. No ESA-listed corals inhabit reef areas that would ever be within the mixing zone. At most, a scalloped hammerhead shark may occasionally swim briefly through some portion of the mixing zone. NMFS expects that a free ranging chemo-sensitive species like scalloped hammerhead sharks would sense the ammonia at concentrations far below levels that could affect its health. NMFS believes that at most, a transitory scalloped hammerhead shark would temporarily alter its path so as to avoid areas within the mixing zone where concentrations of effluent components become an irritant, with no measurable effect on the exposed animal's health and no meaningful changes in its behaviors.

As summarized in NMFS PIRO Habitat Conservation Division's (HCD) April 27, 2015 letter to submit Essential Fish Habitat Conservation Recommendations for the SEIS Proposed Action (NMFS 2015a), nutrient enrichment of marine waters may be linked to increased: 1) macroalgal growth on adjacent reefs (Lapointe 1997); 2) severity of coral disease (Redding et al 2013); and 3) bioerosion, particularly when coupled with ocean acidification (DeCarlo *et al.* 2015). Also, nutrient enrichment appears to be a primary driver for outbreaks of the corallivorous Crown-of-Thorns-Starfish (*Acanthaster planci*) (COTS) through increased larval survival (Brodie *et al.* 2005, Houk and Raubani 2010, Timmer *et al.* 2012). COTS have had a significant effect on Guam's reefs over the past few decades (Colgan 1987, Bonito 2002, Caballes 2009, PIFSC 2012). Action-related additional nutrient loading from the NDWTP may exacerbate the stressors described above on coral reefs along Guam's west coast. Those effects may act synergistically with the effects from the coral bleaching events around Guam in 2006, 2007, 2013, and 2014, and by the paucity of large herbivores on most of Guam's reefs. These impacts may increase in the future due to the effects of climate change including elevated sea surface temperatures and ocean acidification.

Elevated nutrient levels exist in the shoreline waters off the western coast of Guam. Nine wastewater treatment plants (WTP) discharge into marine waters around the island; 5 along the west shore (4 GWA and 1 USN), and 3 on the east shore (all GWA). Additionally, much of the nutrient loading is believed to come from groundwater transport and seeps. McDonald (2002) reported nitrogen concentrations as high as 4 to 5 mg/L in samples taken from wells in the aquifers of Guam. Matson (1993) reports that nitrogen oxide concentrations of 0.27 μM were recorded on the reef flats; dropping off to 0.12 μM about 1 km from shore, suggesting that the source is from groundwater flows. The Navy's EIS/OEIS for the Original Proposed Action reported that the background concentration of Total Nitrogen (TN) near the NDWTP outfall is about 0.15 mg/L, and the TN concentration in the primary-treated effluent is about 47.6 mg/L. Based on an expected initial dilution factor of 300:1 the resulting TN concentration would be about 0.23 mg/L at the outer boundary of the 680-foot mixing zone fading toward the background concentration levels with increased distance away from the outfall.

The Guam aquifer is estimated to discharge between 84.3 and 137.6 billion gallons of water to the ocean every day (BGd) (Matson 1993). GWA reported a 15.7 MGd maximum daily flow at the NDWTP during 4th quarter 2014. This would equate to 0.011 to 0.019% of the groundwater discharge. The expected average daily flow at the peak of the build-up would be 8.3 MGd, which would equate to 0.0060 to 0.0098% of the groundwater discharge, and the DoD proportion of that discharge (2.2 MGd) would equate to a maximum of 0.0026% of the groundwater discharge. Therefore, the volume of additional discharged effluent from the NDWTP would be insignificant compared to the volume of groundwater discharged into marine waters around Guam.

Although the TN concentration within the primary treated effluent is about 320 times that of the receiving waters near the outfall, the TN concentration would be close to background levels within about 680 feet of the outfall. Prevailing winds would typically act to push the effluent plume away from shore, decreasing the potential for exposure of *Acropora globiceps*. Also, on the shallow reef crest where *Acropora globiceps* is most likely to be present, effluent-related

nutrient loading would be virtually undetectable against the nutrient concentrations in the groundwater discharges.

Based on the best available information, NMFS believes that action-related increased effluent discharge at the NDWTP would cause no measurable impacts on scalloped hammerhead sharks and/or *Acropora globiceps* related to exposure to contaminants in the effluent (such as ammonia), or through indirect effects such as enhanced growth of macroalgae, increased incidence of coral diseases, or bioerosion. Similarly, NMFS believes that action-related nutrient loading would cause no detectable increase in the threat of COTS predation on any of the 3 corals considered in this consultation. Therefore, NMFS has determined that action-related increased effluent discharge at the NDWTP would have insignificant effects on scalloped hammerhead sharks and the 3 corals considered in this consultation.

Stormwater and Groundwater Impacts from Upland Projects: The Navy's ESA consultation requests did not address potential impacts of this stressor on scalloped hammerhead sharks or the 3 corals considered in this consultation. However, NMFS believes this stressor may affect those species. The SEIS Proposed Action includes upland construction and operation of cantonment and support facilities, about a mile from the shore, inside the existing footprint of the Naval Telecommunications Site at Finegayan. Family housing and community support facilities would be constructed and operated at Anderson Air Force Base, and the LFTRC would be constructed and operated at NWF. The proposed action also includes the construction of on-site utilities, access roads, and related off-site infrastructure. Although the currently proposed action avoids the disturbance of important limestone forest and groundwater recharge areas near the Haputo Ecological Reserve Area, the action would require large scale land clearing and would increase the amount of impervious surface in the developed areas. The Navy has stated that family housing construction would follow Low Impact Design recommendations, and that they will vegetate the berms and take other steps to minimize erosion and contamination potential at the LFTRC. Otherwise it is unclear how stormwater would be managed in the developed areas.

Guam receives a large amount of rainfall annually and often experiences substantial rainfall events associated with tropical disturbances, storms, and typhoons. As explained in greater detail in the HCD Conservation Recommendations letter (NMFS 2015a), the fate of stormwater and groundwater connections in Northern Guam are not well understood, but available information suggests that stormwater flow from the cantonment, housing, and LFTRC sites may affect nearshore reefs through groundwater discharge, seeps, and overland flow. For instance, stormwater that is captured in the Harmon Sink can reach seeps in East Agana Bay and Tumon Bay in a matter of days (Moran & Jenson 2004).

As described in the wastewater discharge assessment above, groundwater discharge and seeps transport significant levels of nutrients to nearshore waters around Guam. Seeps also affect reef habitats through the volume of freshwater discharged and the chemicals, nutrients, and pathogens that may be carried with it. Similarly, surface stormwater discharges and runoff transport chemical pollutants, nutrients, pathogens, and sediments to nearshore reef areas, where they may cause considerable impacts on reef communities. Changes in the volume of pure freshwater alone can alter salinity and shift coral, seagrass, and macroalgae communities around a discharge point. Therefore, impacts on the quantity and quality of freshwater discharges to the marine

environment that may result from the proposed action may affect ESA-listed corals and scalloped hammerhead sharks though similar mechanisms as those described above.

Nearshore reefs around Guam are clearly being impacted by stormwater and other discharges to the ocean, and the proposed action may increase stormwater discharges. However, the amount of action-related stormwater discharge is likely to be insignificant when compared to background levels, and any potential impacts on ESA-listed marine species that might be attributable to action-related discharges would undetectable against the baseline.

Based on the best available information, NMFS believes that action-related increased stormwater discharges would cause no measurable impacts on scalloped hammerhead sharks and/or any of the 3 corals considered in this consultation related to direct exposure to contaminants, or through indirect effects such as enhanced growth of macroalgae, increased incidence of coral diseases, increased threat of COTS predation, or bioerosion. Therefore, NMFS has determined that action-related increased stormwater discharge would have insignificant effects on scalloped hammerhead sharks and the 3 corals considered in this consultation.

Construction and Operation of the Amphibious Vehicle Laydown Area (AVLA) at Polaris Point: In the Navy's 2015 consultation request, they determined that the construction and operation of the AVLA may affect scalloped hammerhead sharks within Inner Apra Harbor, but would have no effect on any of the three listed corals. With the exception of the University of Guam (UoG) reporting the presence of A. globiceps in the vicinity of Kilo Wharf and at the western end of Orote Point, none of these corals have been documented occurring anywhere within Apra Harbor (USN 2014a). The NMFS PIRO HCD Coral Database reports that none of the three species are found in Apra Harbor (NMFS 2015b). Therefore, NMFS believes that it is discountable that any colonies of the three listed corals are present within Apra Harbor. Based on the best available information about the biology and habitat preferences of the three listed corals considered here, the poor conditions for supporting coral growth in the inner harbor, the expectation that no colonies of these corals occur within the inner harbor, and on the restricted action area for this component, NMFS concurs that this component would have no effect on ESA-listed corals.

In the assessment presented in the consultation request, the Navy determined that the construction and operation of the AVLA could affect scalloped hammerhead sharks through physical impact with heavy equipment, exposure to elevated noise, increased turbidity, loss or degradation of habitat resources, collision with vessels, and behavioral disturbance/displacement. The Navy determined that physical impact by heavy equipment would be discountable. Based on the low numbers of scalloped hammerhead sharks expected to be in the project area, the probability that sharks would avoid the in-water activities, the temporal separation caused by the work being done during the day while the sharks are typically nocturnal, and the BMP that require workers to ensure that no protected species are in the water where heavy equipment or materials would enter the water, NMFS agrees that physical impact by heavy equipment would discountable.

The Navy determined that exposure to elevated noise and turbidity both during construction and operation of the AVLA would have insignificant effects. The in-water soundscape of the inner harbor includes near constant noise from vessel movements and ongoing industrial harbor

operations. Similarly, the waters of Inner Apra Harbor are highly turbid; experiencing frequent dense plumes of fine sediments mobilized by daily vessel operations. Any sharks within the inner harbor are likely habituated to these baseline conditions. The expected in-water noise levels from AVLA construction and operation would be virtually indistinguishable from baseline conditions. In-water construction-related noise would be less than 150 dB re 1 μPa at 1m (USN 2015a), and the in-water noise from landing craft operation would be about the same as a moderate-sized diesel boat, which is well below the 206 dB re 1 μPa peak sound pressure level (SPL) threshold of adverse effect for the fish 2 grams and larger (Stadler and Woodbury 2009). Based on the planned in-water work, including the use of silt curtains around that work, NMFS expects that any project-related elevated turbidity would be relatively small-scaled, short-lived, and contained behind the silt curtains, so as to be virtually indistinguishable from baseline conditions beyond the curtains and having no additive effects. Based on the best available information, NMFS believes that the maximum expected effect of exposure to project-related noise or turbidity would be an avoidance behavior where an exposed shark may temporarily move away from the immediate area, with no measurable impacts on its health. Therefore, NMFS agrees that exposure to elevated noise and turbidity during construction and operation of the AVLA would have insignificant effects on scalloped hammerhead sharks.

The Navy determined that potential loss or degradation of habitat resources would have insignificant effects. Based on the best available information, Abo Cove, at the far southern tip of the harbor, may provide some resources for young scalloped hammerhead sharks and pups. Otherwise, Inner Apra Harbor is poor habitat for scalloped hammerhead sharks (Anecdotal information from UoG cited in USN 2014b & 2015a). The AVLA ramps would impact about 0.25 acres of marine substrate that provides no significant habitat resources, and the project site is near the western end of the harbor, where construction and operation of the AVLA is not expected to affect Abo Cove habitat. Therefore, NMFS agrees that construction and operation of the AVLA would have insignificant effects on habitat resources for these sharks.

The Navy determined that the risk of collision with vessels would be discountable. Scalloped hammerhead sharks do not need to surface to breathe, and only episodically swim at or near the surface. They possess keen senses for detecting fine changes in water pressure and are very agile swimmers capable of avoiding a moving vessel in most cases. Based on the constricted nature of the inner harbor, and on the expectation that landing craft would comply with harbor speed restrictions, NMFS believes that those craft would be operated relatively low speeds in the vicinity of the AVLA, and that scalloped hammerhead sharks in proximity to these craft would be able to easily avoid collision. Therefore, NMFS agrees that the risk collision with AVLA-related vessels would be discountable.

The Navy determined that exposure to behavioral disturbance and/or displacement would have insignificant effects. As described above for exposure to elevated noise and turbidity, the most significant effect expected from exposure to activities related to the construction or operation of the AVLA would be an avoidance behavior where an exposed shark may temporarily move away from the immediate area, with no measurable impact on the individual's health. Therefore, NMFS agrees that exposure to action-related behavioral disturbance and/or displacement would have insignificant effects. Because exposure to component-related stressors is expected to cause no more than insignificant effects, or exposure would be discountable, NMFS concurs that the

construction and operation of the AVLA at Polaris Point in not likely to adversely affect scalloped hammerhead sharks.

Summary: Considering the information in Navy's EIS/OEIS, SEIS, and consultation requests, in the references cited above, and in the best scientific information available about the biology and expected behaviors of the ESA-listed marine species considered in this consultation; NMFS has determined that: 1) The risk of exposure to projectiles from the LFTRC would be discountable; 2) Exposure to action-related increased effluent discharge at the NDWTP would have insignificant effects; 3) Exposure to action-related increased stormwater discharge would have insignificant effects; and 4) Exposure to AVLA-related stressors would have insignificant effects, or the risk of exposure would be discountable. Therefore, NMFS agrees that the proposed action is not likely to adversely affect scalloped hammerhead sharks or the ESA-listed corals *Acropora globiceps, Acropora retusa,* and *Seriatopora aculeata*. NMFS also agrees that the proposed action would have no effect on critical habitat.

Conservation Recommendations:
Despite our determination that the proposed action is not likely to adversely affect ESA-listed species under our jurisdiction, we feel that it is prudent to include conservation recommendations in this letter of concurrence.

1. The Navy should ensure that the NDWTP is upgraded to meet Guam Water Quality Standards (GWQS) by 2021, as discussed in your March 17, 2015 letter, and encourage GWA to reduce nitrate and orthophosphate levels below the GWQS if possible.
2. The Navy should apply the best available measures to minimize stormwater runoff and to prevent increased stormwater discharge through freshwater seeps into nearshore coastal waters to the fullest extent possible.
3. The Navy should develop outreach and training for personnel and dependents to minimize water use, to minimize the use of fertilizers and pesticides, and to properly use and dispose of potential pollutants that may become entrained in stormwater.
4. The Navy should develop operational and recreational guidance to ensure that each unit assigned to Guam, regardless of deployment status, is aware of sensitive protected resources and the need/practices to avoid impacting them, including prohibited activities and off-limits areas as appropriate.
5. The Navy should develop and implement a detailed and comprehensive Adaptive Management Plan, based on current best available information and technologies for watershed management and erosion control.

Note that items 3 through 6 should be institutionalized and included in the Joint Region Marianas (JRM) Integrated Natural resources Management Plan (INRMP).

Conclusion: NMFS concurs with your determination that the Guam and Commonwealth of the Northern Marianas Islands (CNMI) Military Relocation (2012 Roadmap Adjustments) is not likely to adversely affect ESA-listed scalloped hammerhead sharks, and the corals *Acropora globiceps, Acropora retusa,* and *Seriatopora aculeata*, and would have no effect on designated or proposed critical habitat under NMFS's jurisdiction. This concludes your consultation responsibilities under Section 7 of the ESA. If necessary, consultation pursuant to Essential Fish

Habitat would be completed by NMFS' Habitat Conservation Division in separate communication.

ESA Consultation must be reinitiated if: 1) a take occurs; 2) new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the identified action is subsequently modified in a manner causing effects to listed species or designated critical habitat not previously considered; or 4) a new species is listed or critical habitat designated that may be affected by the identified action.

If you have further questions please contact Donald Hubner on my staff at (808) 725-5145. Thank you for working with NMFS to protect our nation's living marine resources.

Sincerely,

Michael D. Tosatto
Regional Administrator

cc: Dan Polhemus, Aquatic Ecosystems Conservation, USFWS, Honolulu
Ryan Winn, Regulatory Branch, US Army Corps of Engineers, Honolulu

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May 27, 2015

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SUBJECT: ESSENTIAL FISH HABITAT ASESSMENT FOR POTENTIAL EFFECTS OF THE GUAM AND COMMONWEALTH OF NORTHERN MARIANA ISLANDS (CNMI) MILITARY RELOCATION (2012 ROADMAP ADJUSTMENTS)

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (16 USC § 1801 et seq.) (MSA) and regulations governing conservation of Essential Fish Habitat (EFH), the Department of the Navy is providing this letter in response to National Marine Fisheries Service's (NMFS) 27 April 2015 letter with conservation recommendations for the potential effects of the proposed Guam and Commonwealth of the Northern Mariana Islands (CNMI) Military Relocation (as addressed in the 2014 Draft Supplemental Environmental Impact Statement [SEIS]). As noted in NMFS's letter, the conservation recommendations are pursuant to the MSA and the National Environmental Policy Act (NEPA).

The DON's responses to the seven (7) EFH conservation recommendations offered in your 27 April 2015 letter pursuant to section 305(b)(4)(A) of the MSA are:

<u>NMFS EFH Conservation Recommendation 1:</u>

A) Recommendation. "The DON should commit to do everything in its power to ensure that the NDWWTP [Northern District Wastewater Treatment Plant] is upgraded to meet Guam Water Quality Standards (GQWS) as discussed in its March 17, 2015 letter. The relevant GQWS are:

1. Not cause orthophosphate concentrations in the receiving water to exceed 0.05 milligram/liter (mg/L)
2. Not cause nitrate-nitrogen concentrations in the receiving water to exceed 0.2 mg/L
3. Not cause ammonia concentration in the receiving water to exceed 0.02 mg/L

Further, the DON should encourage GWA [Guam Wastewater Authority] to reduce nutrient levels even further as the GWQS are still above recommended levels of nitrate and orthophosphate discharges for coral reef habitats."

B) Navy's Response. The DON intends to follow through on statements and commitments made in the EFH consultation letters of 24 November 2014 and 17 March 2015. The fiscal year (FY) 2014 National Defense Authorization Act (NDAA) directed the Secretary of Defense to convene the Economic Adjustment Committee (EAC) in part to develop an implementation plan that will address public infrastructure requirements necessary to support the preferred alternative for the Guam Military Relocation. The NDWWTP was determined to be part of Guam's infrastructure that requires upgrading. Section 8102 of the FY 2014 Consolidated Appropriations Act (Public Law No. 113-76) appropriated $106.4 million to the Secretary of Defense, acting through the Office of Economic Adjustment (OEA), for civilian water and wastewater improvements on Guam. These funds will remain available until expended. Upgrades to the NDWWTP are the first funding and action priority for the necessary improvements to GWA's wastewater treatment system.

While the DON interacts with the Government of Guam (Gov Guam) and GWA, it does not regulate GWA. The U.S. Environmental Protection Agency (EPA) regulates GWA and issues permits for its wastewater treatment plants (WWTPs). The DON will share the EFH conservation recommendations in the 27 April 2015 letter with EPA and GWA so they are aware of NMFS's position on the NDWWTP and GWQS with respect to coral reef habitat.

<u>NMFS EFH Conservation Recommendation 2:</u>

A) Recommendation. "The DON should, to the greatest extent practicable, minimize stormwater runoff and prevent increases in the amount of water discharged through freshwater seeps into nearshore coastal waters. Project specific recommendations include:

a. Family Housing – As this is a re-development of an existing housing area, NMFS recommends that the Navy design the construction and operation to maintain stormwater discharges into sediment basins and other catchments at no more than the current level. As long as volume does not significantly increase through this development, stormwater discharges should not affect new areas of EFH. The DON should develop outreach and training to personnel and dependents to minimize water use in households and on DON property that may result in additional wastewater and/or stormwater. Additionally, these efforts should also focus on minimizing potential pollutants that become entrained in sheet flow and ground water.

b. Finegayan Cantonment – NMFS recommends that the DON phase land clearing and maximize stormwater containment actions during the construction of the cantonment to avoid impacts to EFH. NMFS further recommends that DON examine the potential fate of stormwater discharges to determine whether they may affect nearshore reefs such as Double Reef and Haputo through overland flow or seeps. NMFS recommends that any transport be minimized and slowed to the greatest extent practicable. This may involve implementing actions such as minimizing impervious surfaces, diverting stormwater into a number of smaller swales rather than channeling flows into a single basin, use of water catchment and reuse strategies, using green roofs, or other low impact design features. DON should also develop outreach and training to personnel to minimize water use on DON property that may result in additional wastewater and/or stormwater. Additionally, these efforts should focus on minimizing potential pollutant that become entrained in sheet flow and ground water.

c. Northwest Field LFTRC – NMFS recommends that the DON phase land clearing and maximize stormwater containment actions during the construction of the LFTRC to avoid impacts to EFH. We further recommend that the DON examine the potential connection to groundwater flow that may affect nearshore reefs such as Jinpasan and the Ritidian HAPC [Habitat Area of Particular Concern]. NMFS recommends that any discharge to these areas be minimized and slowed to the greatest extent practicable. This may involve implementing actions such as minimizing impervious surfaces, diverting stormwater into a number of smaller swales rather than channeling flows into a single basin, regular clearing of expended rounds and contaminated soil, using green roofs, or other low impact design features."

B) Navy Response. Under Section 438 of the Energy Independence and Security Act of 2007, DoD is required to reduce stormwater from federal development and redevelopment projects to protect water resources. DoD can comply with this if the project uses a low impact development (LID) management practice. LID measures would be consistent with guidelines provided in UFC 3-210-10 and stormwater management techniques provided in the CNMI and Guam Stormwater Management Manual. Furthermore, as a condition of concurrence to the DON's Programmatic Coastal Consistency Determination for the Marine Corps Relocation, NOAA's *Stormwater Management in Pacific and Caribbean Islands: A Practitioner's Guide to Implementing LID, February 2014* will be included as a design reference in all projects implementing the proposed action. All occupied facilities for the proposed action are planned to be designed to meet LEED Silver or equivalent standards, which include water use reduction criteria. The DON's water use reduction goals are directed by Executive Order 13514. Appendix F2 of the Draft SEIS provides LID conceptual designs. These conceptual designs will be developed further for the selected alternative.

The DON notes that NMFS recommends studies of movement of groundwater and stormwater to nearshore reefs. The DON is aware of US Geological Survey (USGS) study report entitled "The Effects of Withdrawals and Drought on Groundwater Availability in the Northern Guam Lens Aquifer, Guam." USGS used a three-dimensional model that simulates the transition from freshwater to saltwater to investigate the effects of drought on groundwater flow and salinity. Although this study is limited to modeled groundwater flow and is not meant to be used to plan for the potential fate of pollutants, it suggests that that percolation through the aquifer and discharge towards the coast is the predominant pathway for potential surface-derived pollutants when LID is applied in Northern Guam. A simulated freshwater discharge map in the USGS report suggests that Haputo Bay adjacent to Finegayan is a key freshwater seep and spring discharge location on the Guam coast. The DON has prioritized considerations about maintaining groundwater integrity at Finegayan. USGS and University of Guam-Water and Environmental Research Institute (UoG-WERI) are currently conducting a DoD-funded and supported study that includes the Haputo Bay area to define aquifer hydrogeological characteristics. Study results will be considered for use in the future by the DoD as an adaptive management tool.

The DON will phase land clearing during the initial years of the construction period. Land will not be cleared and allowed to remain unmanaged without stormwater run-on or runoff controls for extended periods of time before construction. The DON will voluntarily apply stormwater management practices at construction sites in accordance with USEPA's 2012 Construction General Permit even without discernible conveyances of stormwater to surface water.

NMFS EFH Conservation Recommendation 3

A) Recommendation. "The DON should further examine the fate of stormwater for these projects, particularly the Finegayan Cantonment and the LFTRC, to determine whether stormwater practices affect sensitive nearshore reefs such as the HAPCs at Haputo Ecological Reserve Area and Ritidian Guam National Wildlife Refuge through seeps. NMFS recommends that any additional discharges resulting from this action be minimized and slowed to the greatest extent practicable. This may include minimizing impervious surfaces, diverting stormwater into a number of smaller swales rather than channeling flows into a single basin, regular clearing of expended rounds and contaminated soil, using green roofs, or other low impact design features."

B) Navy Response. The DON will apply stormwater practices that take advantage of stormwater detention features vice direct injection of stormwater into the aquifer or uncontrolled discharge into sinkholes. Other pollution prevention practices will include measures such as proper storage of pollutant-generating material and regular maintenance of range backstops in accordance with the USMC's Range

Environmental Vulnerability Assessment (REVA) program. Groundwater quality baseline data will be obtained during the construction of monitoring wells to support the site specific REVA program.

NMFS EFH Conservation Recommendation 4

A) Recommendation. "The Record of Decision for the Final SEIS should clearly identify funding and provide minimum guidelines for programs to minimize impacts from training, recreation, and fishing activities for the US Marine Corps personnel. Ideally, these programs should instill a sense of environmental stewardship in personnel. The programs should not simply be a presentation, signs, or a brochure as these methods lack effectiveness. It is important to include performance metrics and adaptive management capacity to ensure that the education and outreach program is effective."

B) Navy Response. Program evaluation and improvement is an ongoing activity through the Joint Region Marianas (JRM) Integrated Natural Resource Management Plan (INRMP) which will apply to the proposed relocating Marine Corps units and installation. The JRM INRMP will develop qualitative and/or quantitative performance metrics for stewardship programs and implementing instructions. The DON has implemented environmental stewardship programs that have been determined to be effective including, but not limited, to the production and timely distribution of information to incoming Department of Defense (DoD) personnel to Guam installations. The DON will continue to evaluate program effectiveness through a process of incorporating feedback and monitoring from target audiences and partner agencies in an effort to identify and plan for improvement.

Given that the stewardship programs apply mainly in an operational context (training and recreation) and that Marine Corps operations are a number of years away, it is not possible to identify specific sources of funding linked to Marine Corps units in the ROD. Subject to Congressional authorization and appropriations, funding is expected to be available in the future through installation Operations & Maintenance budgets and combined with other DoD funding to adequately resource environmental stewardship programs Region-wide.

NMFS EFH Conservation Recommendation 5

A) Recommendation. "Ensure that each unit assigned to Guam irrespective of duration and deployment status will institute a PT [physical training] awareness and operational guidance that identifies appropriate PT areas as well as identify area that are off-limits for such activities (e.g. Haputo Ecological Reserve Area, Limestone Forest, and Reef Flats) in coordination with installation and regional resource management plans."

B) Navy Response. The DON will ensure that all Marine Corps units assigned to Guam will be made aware of appropriate physical training restrictions and guidance in regard to sensitive areas on JRM installations including, but not limited, to areas such as forests, reefs, beaches, ecological reserve areas, and other sensitive habitat. These restrictions and guidelines will be incorporated, as appropriate, into natural resource management plans currently under development. It is primarily the responsibility of base commands to implement guidance through base instructions that are in accordance with natural resource management plans.

NMFS EFH Conservation Recommendation 6

A) Recommendation. "Develop methods to minimize fishing impacts by reducing take of fish species from key functional groups and rare species. This could include a ban for Department of Defense personnel on use of destructive methods of fishing such as scuba spearfishing, night time spear fishing with lights, and gill nets, as well as bans on species of local concern such as *Cheilinus undulatus* and *Bolbometopon muricatum*."

B) Navy Response. Navy Base Guam and Andersen Air Force Base have existing bans on spearfishing activity on DoD-controlled submerged lands. The DON will coordinate with JRM to update the JRM INRMP and installation fishing instructions to include elements of NFMS's recommendations. At a minimum, increased awareness about destructive fishing methods will be addressed with Marine Corps units assigned to Guam, for submerged lands beyond the custody and control of the DoD.

NMFS EFH Conservation Recommendation 7

A) Recommendation. "The DON should provide a commitment to develop and implement a detailed and comprehensive Adaptive Management Plan that defines watershed management and erosion control mechanisms that will be adopted based on current best available information (e.g. Guam's proposed storm water management guidelines) and involves a protocol articulating the framework for: a) documenting gaps, problems, and resource needs associated with action related project and activity effect to EFH from land based pollution (from construction, waste water treatment, use of utilizes, and solid waste disposal) and overfishing; b) filling the identified information/data gaps by conducting assessment and monitoring studies that characterize and quantify the amounts of pollution (via for example dye trace studies and mapping freshwater seeps); the residence time of pollutants in near shore areas; the frequencies of major pollution events; and the physical, hydrodynamic spatial and biological properties of nearshore areas; c) incorporating these findings to update the existing management plan by researching, identifying and implementing cutting edge engineering/management

measures that will reduce the sources and levels of pollution, focusing at sources with greatest impacts to EFH; and d) assessing and mitigating cumulative impacts."

B) Navy Response. The Conservation Recommendation 7 provides guidance for elements for a long-term program. The DON will examine, in detail, and prioritize elements of Conservation Recommendation 7. Individual components will be integrated with management projects in the INRMP, as appropriate, to create a management plan that could address the issues in Conservation Recommendation 7.

We appreciate the time and careful consideration that went into evaluating the potential effects of the proposed Guam and (CNMI) Military Relocation and providing EFH conservation recommendations. Should you have any questions regarding the DON's response, please contact Randy Sablan at (671) 483-0261 (randel.sablan@fe.navy.mil) or Dr. Sean Hanser at (808) 472-1388 (sean.hanser@navy.mil).

Sincerely,

J. A. CAMPBELL
By direction

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March 6, 2015

From: Deputy Assistant Secretary of the Navy (Environment)

Subj: REGIONAL BIOSECURITY PLAN FOR MICRONESIA AND HAWAII

Dear Plan Stakeholder,

The Department of the Navy (DON) is pleased to announce the completion of the Regional Biosecurity Plan (RBP) for Micronesia and Hawaii. The RBP provides science-based biosecurity recommendations for the State of Hawaii, United States Territory of Guam, Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia (Chuuk, Kosrae, Pohnpei and Yap), Republic of the Marshall Islands, Republic of Palau, and the United States Departments of Defense (DoD), Agriculture, and Interior. This comprehensive plan provides a platform for coordination and integration of interagency prevention, management and control of invasive species within and into the region. Due to its large size, electronic copies of the RBP, including all appendices, will be distributed to all stakeholders under separate cover.

The 20th Micronesian Chief Executive Summit Joint Communique Section II, Part 7 officially accepted and reaffirmed the importance of the RBP as well as the need to implement recommendations contained in the plan. The United States announced its support for the RBP at the Pacific Islands Forum (PIF) held in September 2013 and the RBP was featured at PIF in July 2014. Jurisdictions and agencies covered in the RBP should determine how best to move forward with implementing recommendations. Additionally, the RBP is intended to be a "living" document and, as such, stakeholders should update their elements of the plan to ensure it remains current and functional.

The RBP represents the work and contributions of many individuals, organizations, and government agencies. We thank all those that were involved in the development of this multi-national interagency effort and look forward to our continued partnership in biosecurity efforts in Micronesia and Hawaii.

My points of contact for this effort are Mr. J. Dan Cecchini at joseph.cecchini@navy.mil – (703) 614-1173 or Ms. Tamara Conkle, Naval Facilities Engineering Command Headquarters at Tamara.Conkle@navy.mil – (202) 685-9203.

Sincerely,

Donald Schregardus
Deputy Assistant Secretary of the Navy
Environment

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