APPENDIX J-5

PRESCRIBED BURN FNSI & EA

FINAL

FINDING OF NO SIGNIFICANT IMPACT

1. Name of Project: Prescribed Burn at Makua Military Reservation, Island of Oahu.

2. Proponent Organization: 25th Infantry Division (Light) and U.S. Army, Hawaii
U.S. Army Garrison, Hawaii
Schofield Barracks, Hawaii

3. Environmental Assessment: The Environmental Assessment for the "Prescribed Burn at Makua Military Reservation, Island of Oahu" dated August 2002, is incorporated by reference.

4. Description of Project: The purpose of the Proposed Action is to conduct a prescribed burn to remove vegetative cover in specific areas of Makua. The burn would allow the Army to accomplish certain UXO clearance and an archaeological survey pursuant to the requirements of the Settlement Agreement with Malama Makua dated October 4, 2001. It is difficult to safely enter an area where there is suspect UXO or to perform UXO removal operations when there is vegetative cover. After the prescribed burn is completed, Explosive Ordnance Specialists will make a determination whether access will be allowed in these areas.

Per a Settlement Agreement and Stipulated Order between the plaintiff, Malama Makua, and the U.S. Department of the Army, dated October 4, 2001 ("Settlement Agreement"), the Army is required to conduct, under paragraph 6.c., archaeological surveys within the CCAAC training area of Makua Military Reservation (MMR), circumscribed by the south firebreak road, and to also conduct surface archaeological surveys of all Surface Danger Zone areas located outside the firebreak road. In addition, pursuant to paragraph 8.a., in order to reduce the risk to individuals on Makua Beach and Farrington Highway, the Army is required, subject to funding, safety requirements and Section 7 consultation, to conduct unexploded ordnance (UXO) clearance for the area within MMR extending 1,000 meters mauka (towards the mountain) from Farrington Highway for public safety.

In addition, the clearing of vegetation would reduce the potential fire risk to listed species. Currently, non-native grasses and other vegetation, specifically guinea grass (*Panicum maximum*) and haole koa (*Leucaena leucocephala*) are approximately 3-6 feet high in areas not maintained by a grass cutting contract. The current age of the grass growing on the steep slopes of SDZ 1 is estimated to be about four years, since the last fires recorded were in July 1995 and March 1998. The vegetative fuel load is at maximum and any accidental ignition would be difficult to control.

a. Alternatives Considered:

(1) Proposed Action. Under the Proposed Action, three prescribed burn alternatives are proposed based on the amount of land to be burned. Each alternative involves varying amounts of land and proposes a sequence and method that would be used when proper criteria are met.

These alternatives are:

(a) Alternative 1 - Prescribed Burn Plan 1. Under this Alternative, a total of approximately 485-607 hectares (1,200-1,500 acres) would be burned within the north and south firebreak roads and areas outside the firebreak road, including the SDZ and 1,000 meter buffer areas. This Alternative poses the greatest risk to listed species under the Endangered Species Act.

(b) Alternative 2 - Prescribed Burn Plan 2. Under this Alternative, a total of approximately 324-364 hectares (800-900 acres) would be burned within the north and south firebreak (Units A and B) and smaller parcels outside the firebreak road (Units C1 and C2).

(c) Alternative 3 - Prescribed Burn Plan 3. Under Alternative 3, a total of approximately 283 hectares (700 acres) would be burned within the north and south firebreak roads. The prescribed burn would only take place within the firebreak roads and would be done consecutively in small sections. This alternative is similar to the prescribed burns that were routinely conducted in the 1990s.

(2) The No-Action Alternative. Under the No-Action Alternative, the U.S. Army would not conduct a prescribed burn to clear vegetation to allow UXO clearance and archaeological surveys as required under the Settlement Agreement. The Army would be unable to comply, in part or full, with the requirements of 6.c. and 8.a. of the Settlement Agreement. Although the Army performs limited fuels management (mowing and herbiciding) within the south firebreak, the potential fire risk to listed species would remain because the high fuel load would still remain.

(3) Alternatives Considered but Not Carried Forward. The Chemical Treatment Alternative was not carried forward because application of this alternative would result in dead vegetative cover that would still obscure ground visibility. Mechanical clearing of vegetation is not feasible due to terrain conditions and would have a similar, if not the same, result as the Chemical Treatment Alternative.

5. Anticipated Environmental Consequences: The EA analyzed the impacts of each alternative on the affected environment and cumulative impacts. Based on mitigation measures to be undertaken by the Army to control the prescribed burn, the EA concludes that there will be no significant impacts to the environment with Alternatives 2 and 3. The following subparagraphs summarize anticipated environmental impacts of the Proposed Action:

a. Geology and Soils. The Proposed Action would result in loss of vegetative cover thereby increasing the potential for soil erosion. However, this impact is anticipated to be short-term and temporary because new vegetation appears within a month depending on weather conditions. Military training activities have resulted in some soil erosion, however, the Army uses soil erosion control measures for its modified CALFEX training and range maintenance. Accordingly, no significant cumulative impacts on geology and soils are associated with the Proposed Action.

b. Air Quality. There is a potential for unanticipated wildfires to burn in the general area at the same time as the prescribed burn. A combination of an unanticipated wildfire and the scheduled prescribed burn could result in a cumulative negative impact to air quality. However, due to the prevailing tradewinds in Hawaii, remote location of MMR, and past history of prescribed burns at MMR, this situation would not likely occur and create a cumulative negative impact to air quality.

c. Noise. The incremental increase in noise from prescribed burn activities (e.g., helicopters) and accidental detonation of unexploded ordnance would not have a cumulatively significant impact. Noise impacts from the Proposed Action would be temporary and short in duration. The Army will provide advance notice to the public of burn dates and times to minimize possible impacts.

d. Traffic. Traffic may be temporarily impacted from the smoke of the proposed burn but no significant cumulative impact on traffic would occur.

e. Hazardous and Toxic Materials. The Proposed Action would not have a significant cumulative impact related to hazardous and toxic materials since the Army would take precautions to properly use and handle hazardous and toxic materials. Spill response equipment would be on site to minimize harm. The materials proposed for use are considered "environmentally safe" or would be consumed in the fire.

f. Threatened and Endangered Species. Per informal consultation with U.S. Fish and Wildlife (USFWS) Service, the Army will need to initiate formal Section 7 consultation under Alternative 1 because the Proposed Action will pose a significant risk to listed species and designated and proposed critical habitats. In addition, this alternative would directly destroy listed species. The USFWS concurs that either Alternatives 2 or 3 is not likely to affect listed species or designated or proposed critical habitats. In addition, the Proposed Action would reduce the fire fuel loads which would indirectly benefit listed species and designated and proposed critical habitats. There would be no significant cumulative impact on biological resources for Alternatives 2 and 3.

g. Historic and Archaeological Resources. There would be no significant cumulative impact on historic and archaeological resources. Fires of low intensity generally do not damage these resources and precautions would be taken to protect resources by strictly adhering to the prescribed burn plan.

h. No short-term or long-term adverse effects are anticipated to water resources, land use, socioeconomics, and Environmental Justice and Protection of Children.

6. Conclusion. Based on the analysis of environmental consequences and cumulative impacts of the Proposed Action in the EA, the Army will implement Proposed Action - Prescribed Burn Plan 2. This alternative includes all of the land areas identified in the Settlement Agreement except for portions outside Unit A within the SDZ, a portion outside Unit C2, and the South Buffer. Approximately 60% of the area identified in the Settlement Agreement would be burned. USFWS has concurred that this alternative will not adversely affect listed species.

Upon the successful completion of the proposed prescribed burn, the Army will consider reinitiating formal consultation with the USFWS for clearing the remaining areas (approximately 40% of the area identified in the Settlement Agreement) not proposed for burn in Prescribed Burn Plan 2, but identified in Alternative 1.

APPROVED:

David L Anderson 28 Oct '02

DAVID L. ANDERSON Date
Colonel, U.S. Army
Commander, U.S. Army Garrison, Hawaii

DEPARTMENT OF THE ARMY
25TH INFANTRY DIVISION (Light) AND U.S. ARMY, HAWAII

ENVIRONMENTAL ASSESSMENT FOR A PRESCRIBED BURN AT MAKUA MILITARY RESERVATION, ISLAND OF OAHU

August 2002

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Table of Contents

List of Figures

Table

Appendices

Appendices (continued)

1.0 Introduction.

This Environmental Assessment (EA) is prepared to comply with the substantive provisions of the Council of Environmental Quality (CEQ) National Environmental Policy Act (NEPA), 40 CFR Part 1500-1508, and the Department of the Army's Final Rule (32 CFR Part 651) "*Environmental Analysis of Army* Actions" to consider environmental consequences when authorizing or approving major federal actions. A list of federal laws and regulations that are or could be relevant to this EA is included in Appendix A.

Makua Military Reservation (MMR) is the only training area on Oahu that currently supports Combined Arms Live Fire Exercise (CALFEX) training for the 25th Infantry Division (Light) and U.S. Army Hawaii (the "Army") (25th Infantry Division Light (L) and U.S. Army Hawaii 2001a). It comprises 1,696 hectares (4,190 acres) and is located in an amphitheater-shaped valley on northwestern Oahu (Figure 1). Of the 1,696 hectares (4,191 acres), 419 hectares (1,034 acres) is suitable for maneuver and training and 787 hectares (1,944 acres) is designated as an impact area. The MMR maneuver area is split into two areas by Kahanahaiki Ridge extending from east to west. The northern portion is known as Kahanahaiki Valley and the larger southern area is known as Makua Valley. Currently, the Army's training occurs primarily in Makua Valley on the 99 hectares (245 acres) Company Combined Arms Assault Course (CCAAC) within the south firebreak road where live ammunition is aimed at targets. In a CALFEX, a light infantry company is supported by a combat engineer squad, battalion mortars and direct support artillery. Attack and assault lift helicopters will also participate, when available. The CCAAC also supports most small arms weapon systems, including limited air-to-ground helicopter aerial gunnery.

Within the last decade, the Army conducted prescribed burns in portions of MMR in an effort to reduce vegetative fuel loads to minimize risk of potential wildfires caused by military training activities (Figure 2). Prescribed burning has been successful within and around training areas surrounded by the established firebreak road network of Units A and B (U.S. Army Garrison, Hawaii 1990). In the early 90's, controlled burns were conducted outside these primary road systems and were proven successful with the exception of one escaped fire in 1995. The technique used outside of the firebreak road was a standard accepted method of fire suppression line building using a long-term (effective for three days) Liquid Concentrate (LC) Fire Retardant. A containment line was constructed using this retardant and firing operations were initiated from within these lines. Based on the Army's 1990 EA for prescribed burns for routine range maintenance and consultations with the U.S. Fish and Wildlife Service (USFWS) and State Historic Preservation Officer (SHPO), the Army determined that its prescribed burn was a safe operation with minimal risk of fire escape when applied and executed properly and would not significantly impact the environment (U.S. Army Garrison, Hawaii 1990). The USFWS, in its Biological Opinion (1-2-90-F-016), concluded that the proposed burns would not likely jeopardize the continued existence of the Oahu tree snail, the only listed species on MMR at that time (although there were 11 species of plants identified at MMR, none of these had listed status). The National Historic

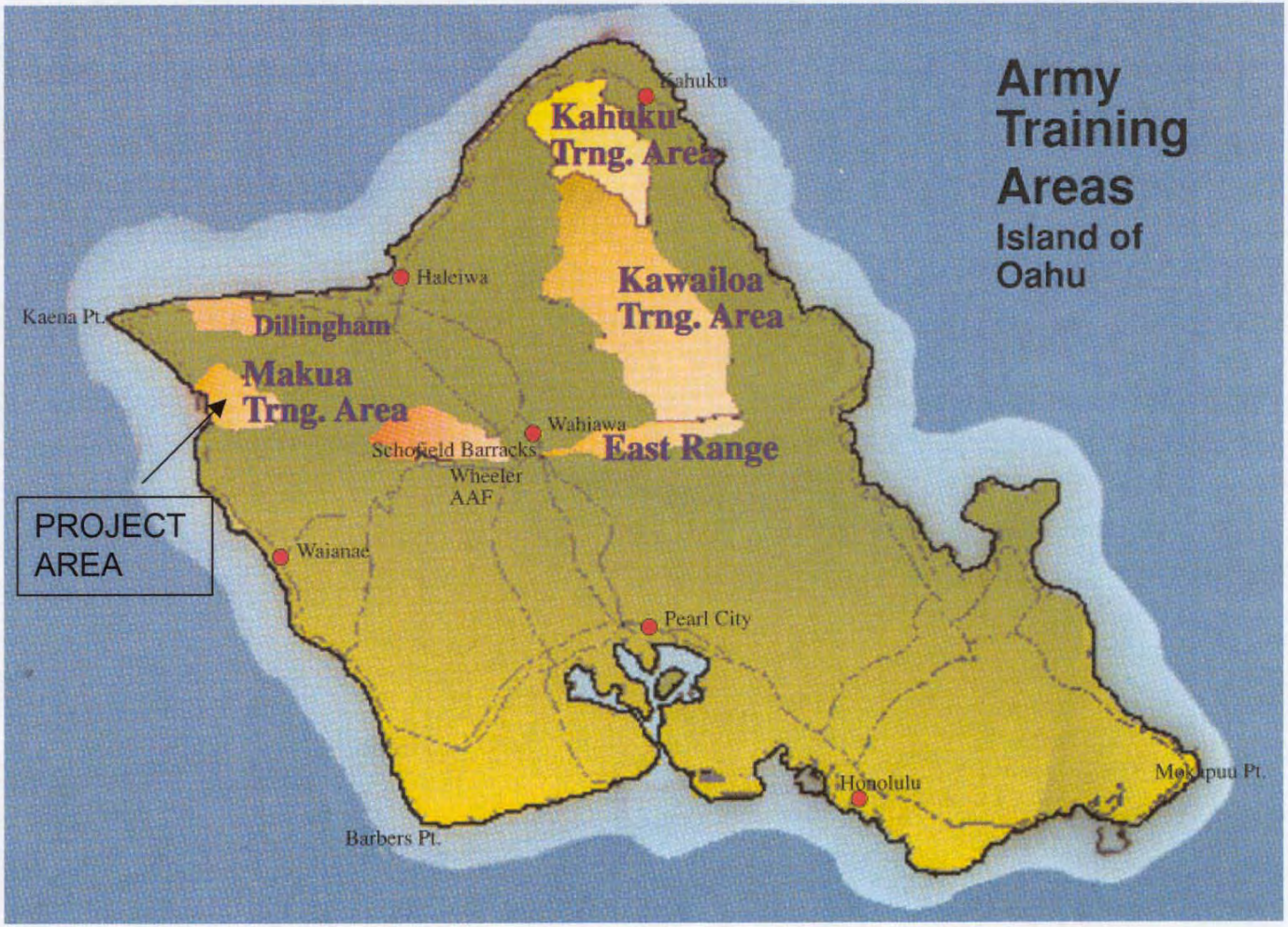


Figure 1. Location of Makua Military Reservation

Figure 2. Areas Previously Burned

Preservation Act (NHPA) Section 106 consultation concluded with a "no adverse effect" on significant historical sites.

Currently, there are 53 documented cultural resources, 34 listed endangered plant species (42 listed species in or near MMR), two endangered birds (Oahu creeper or *Paroreomyza maculata* and Oahu elepaio or *Chasiempis sandwichensis ibidis*), one endangered mammal (Hawaiian hoary bat or *Lasurius cinereus semotus*), and one endangered invertebrate snail (Oahu tree snail or *Achatinella mustelina*) at MMR.

In 1998, the Army voluntarily suspended training due to several accidental fires. These fires occurred during training from a grenade simulator, simulator missile, and an errant mortar round. Other fires were caused by non-military activities.

The Army was sued by the citizen group Malama Makua, who alleged that the Army failed to comply with NEPA for its training at MMR. To settle this lawsuit, the Army agreed to prepare a NEPA document prior to returning to live-fire training at MMR. In December 2000, the Army released its Draft Supplemental Environmental Assessment (SEA) and a Finding of No Significant Impact (FNSI) for "Routine Training at Makua Military Reservation." However, the Army subsequently retracted the documents to address public concerns raised at community meetings. In May 2001, the Army released the Final SEA and FNSI. The training proposed by the Army in the SEA was modified to be more protective of the environment by limiting the use of weapon systems, realigning targets as well as limiting the number of soldiers training at one time to a company rather than a battalion. Malama Makua challenged the sufficiency of the FNSI and SEA and alleged that an Environmental Impact Statement (EIS) was required under NEPA. In July 2001, the U.S. District Court issued a preliminary injunction barring the Army from returning to training until the Court could decide the outcome of the NEPA challenge. After the September 11, 2001 attack, the Army and Malama Makua reached a settlement to allow the Army to return to live-fire training while simultaneously preparing an EIS.

Per the Settlement Agreement and Stipulated Order between the plaintiff, Malama Makua, and the U.S. Department of the Army, dated October 4, 2001 ("Settlement Agreement") (Appendix B), the number of CALFEXs at MMR is limited for a period of three years until an EIS that assesses military training is completed. In the first year the Army may conduct 16 CALFEXs, 9 in the second year, and 12 in the third year.

2.0 Purpose and Need for the Proposed Action.

The purpose and need for the Proposed Action is to allow for the clearing of vegetation to accomplish certain archaeological surveys and unexploded ordnance (UXO) clearance requirements of the Settlement Agreement and to minimize fire risk to listed species by reducing the existing fuel load.

The Settlement Agreement requirements cannot be accomplished safely without the clearing of the surface vegetation. It is dangerous to enter an area where there is suspect UXO or to perform UXO removal operations when there is vegetative cover. The Army would perform a prescribed burn at MMR to remove vegetation to allow safe access into the areas

Under paragraph 6.c. of the Settlement Agreement, the Army is required, subject to certain constraints, to conduct archaeological surveys within the CCAAC training area of MMR, circumscribed by the south firebreak road, and to also conduct surface archaeological surveys of all Surface Danger Zones (SDZs) areas located outside the south firebreak road. The surface survey outside of the south firebreak road would take place only after the area has been burned and surveyed for UXO and will be subject to limitations imposed by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act Section 7 consultation and any limitations on clearance of UXO based on technical feasibility. In addition, pursuant to paragraph 8.a., in order to reduce the risk to individuals on Makua Beach and Farrington Highway, the Army is required, subject to funding, safety requirements and Section 7 consultation, to conduct UXO clearance for the area within MMR extending 1,000 meters mauka (towards the mountain) from Farrington Highway for public safety (Figure 3).

In addition, the clearing of vegetation would reduce the potential fire risk to listed species. Currently, non-native grasses and other vegetation, specifically guinea grass (*Panicum maximum*) and haole koa (*Leucaena leucocephala*) are approximately 3-6 feet high in areas not maintained by a grass cutting contract. The current age of the grass growing on the steep slopes of SDZ 1 is estimated to be about four years, since the last fires recorded were in July 1995 and March 1998. The vegetative fuel load is at maximum and any accidental ignition would be difficult to control.

3.0 Description of the Proposed Action and Alternatives.

3.1 Proposed Action - Prescribed Burn. The Proposed Action would be to conduct clearance of vegetation through a prescribed burn to allow the Army to comply with UXO clearance and archaeological surveys required under the Settlement Agreement and to reduce the fuel load in an effort to minimize the risk of fire to listed species.

Prescribed burning is a method of fuel reduction employing combustion to remove biomass and is conducted by qualified individuals under specified weather conditions. Burning generally takes place under optimal burn conditions that permit adequate combustion as well as control.

Historically, prescribed burning has been conducted at MMR, with the last one occurring in 1995. Since that time, the Army has hired experts to study wildfire management at MMR (Beavers et al. 1999 and Beavers 2001) and improvements in technology and availability of more fire-fighting resources have improved fire preparedness and suppression.

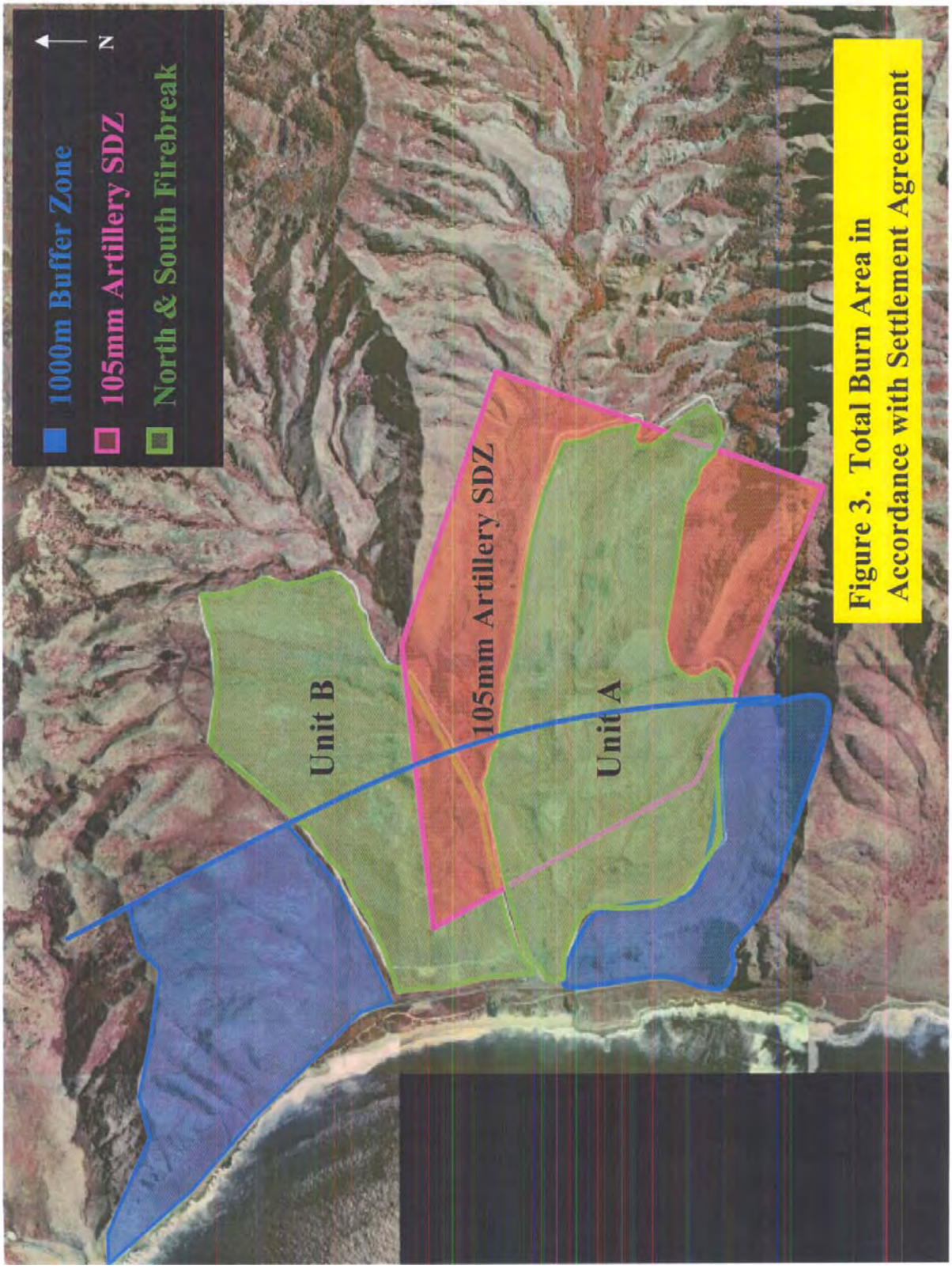


Figure 3. Total Burn Area in Accordance with Settlement Agreement

The Army has prepared a “Prescribed Burn Plan” (Appendix C) that addresses responsibilities, equipment, fire prescription, weather, contingency, risk and safety, and proposes three prescribed burn alternatives. Each of the three prescribed burn alternatives would include a test burn as described in a. below, and either one or both methods as described in b. and c. below.

a. A test burn would be conducted each day to evaluate fuel consumption, fire behavior, and smoke dispersal prior to conducting the prescribed burn. The prescribed burn would commence, if the criteria for the burn conditions were met.

b. Two methods of fire ignition are proposed for use for the prescribed burns. The first is by drip torch, which involves walking along the firebreak road or within units and manually igniting vegetation. The second method would be aerial ignition. Aerial ignition involves the use of a mechanical dispenser (PREMO MK III) that injects antifreeze (ethylene glycol) into a plastic sphere (“ping pong ball”) containing potassium permanganate. An exothermic reaction occurs within the activated "ping pong balls" which are dropped from the helicopter onto the vegetation below to start the fire. The “lighting boss” within the helicopter controls the device and the rate of firing. The Army would employ either one of these methods or both if required. Aerial ignition would be used, if interior portions of a unit fail to ignite.

c. The Army would use a LC fire retardant manufactured by Fire-Trol® to create a ten-foot wide primary fire retardant line to contain fire within specific burn areas. It is effective for three days after application, unless there is heavy precipitation and is washed away. Thereafter, it begins to biodegrade and becomes comparable to a mild fertilizer. Fire-Trol® is an environmentally safe fire retardant used by the U.S. Forest Service.

The retardant is stored in 55-gallon drums and needs to be mixed with water to become effective. The Army would construct a 5,000-gallon storage tank that would allow mixing of retardant and water and to hold the retardant. A fire bucket attached to a helicopter would be lowered into the storage tank and filled with the LC retardant. After the bucket is filled, the helicopter would proceed to apply the LC to create a retardant line. The retardant contains a red-colored dye to visually ensure that the helicopter crews apply a continuous retardant line.

Two UH-60 helicopters would be on site equipped with fire buckets. These helicopters would be mobilized with retardant, should any weak points in the retardant line need reinforcement. In addition, these helicopters would be available for emergency firefighting response using water and foam. There are two dip ponds located on MMR, each with a 300,000-gallon capacity. Another helicopter would be on standby and stationed at Wheeler Army Air Field in case it is needed to support emergency firefighting response. Encroachment of fire over any retardant line would be treated as a wildfire and all planned ignitions would cease immediately until the declared wildfire is under control.

The Army has also coordinated with the Federal and City and County Fire Departments to be on-site during the prescribed burn. These Departments would support any emergency firefighting response needed.

The "Prescribed Burn Plan" (Appendix C) that proposes three alternatives based on the amount of land to be burned. Each alternative involves varying amounts of land and proposes a sequence and method that would be used when proper criteria are met. The Prescribed Fire Manager would determine, based on his/her experience and consultation with other qualified individuals, whether a sequence and/or method would change based on conditions on any given day. Therefore, the proposed days, sequence, or method for each alternative may vary.

3.1.1 Alternative 1 - Prescribed Burn Plan 1. Under this Alternative, a total of approximately 485-607 hectares (1,200-1,500 acres) would be burned within the north and south firebreak roads and areas outside the firebreak road, including the SDZ and 1,000 meter buffer areas. Per the Settlement Agreement, these areas would require archaeological surveys and UXO clearance (Figure 4). Units A and B are the areas inside the firebreak road network and would be burned prior to any burning operations outside of the firebreak road. This Alternative does not encompass limitations and constraints imposed by compliance with the Endangered Species Act.

Vegetation growth is currently controlled on approximately 99 hectares (245 acres) in the accessible areas by a grass-cutting contract. Mechanical cutting is the primary method of controlling vegetation in the CCAAC training area. In addition to mowing operations, a general herbicide Roundup® (Glyphosate) is applied to destroy vegetation growing along fencelines, on road shoulders, and the firebreak road.

A ten-foot wide primary fire retardant line would be applied for the SDZ and buffer areas, which are located outside the firebreak roads.

The total prescribed burn area is comprised of Unit A, Unit B, SDZ 1, SDZ 2, the North Buffer, and the South Buffer as shown on Figure 4. It is anticipated that the prescribed burn would be completed within seven days as described below.

Day One - Unit A

From Point A to Point B - Drip Torch
From Point B to Point C - Drip Torch
From Point E to Point F – Drip Torch
From Point F to Point D, simultaneously with Point E to Point A – Drip Torch
From Point D to Point C – Drip Torch

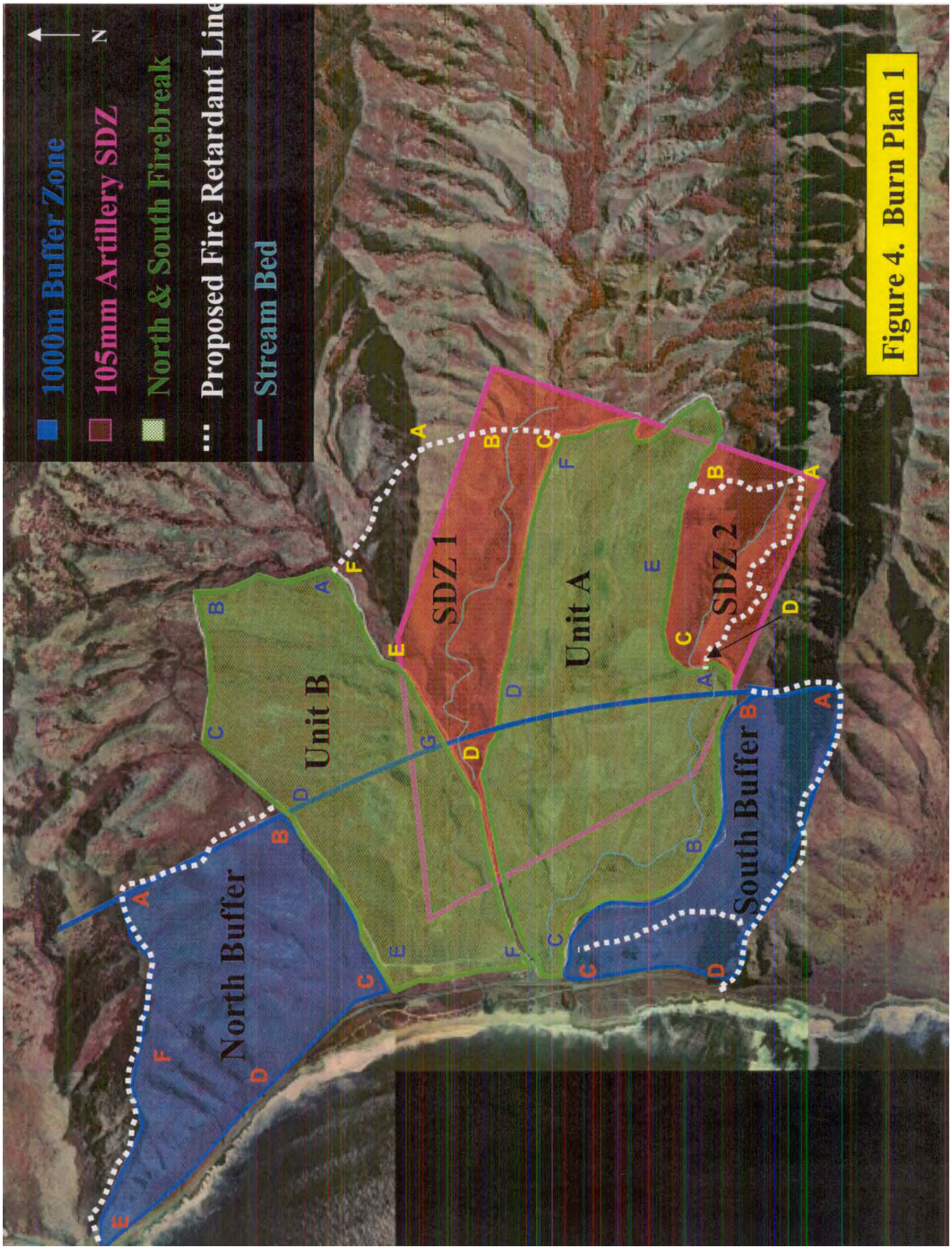


Figure 4. Burn Plan 1

Day Two - Unit B
From Point A to Point B, simultaneously with Point A to Point G – Drip Torch
From Point B to Point C – Drip Torch
From Point C to Point D – Drip Torch
From Point D to Point E, simultaneously with Point G to Point F – Drip Torch
From Point E to Point F – Drip Torch

Day Three - Application of Fire Retardant
(SDZ 1) From Point C to Point F
(SDZ 2) From Point B to Point A
(SDZ 2) From Point A to Point D

Day Four - SDZ 1
From Point A to Point B - Aerial
From Point A to Point F - Aerial
From Point B to Point C - Drip Torch
From Point C to Point D - Drip Torch
From Point E to Point F - Drip Torch
From Point D to Point E - Drip Torch

Day Five - SDZ 2
From Point A to Point B - Aerial
From Point A to Point D - Aerial
From Point B to Point C - Drip Torch

Day Six - North Buffer
Application of Fire Retardant
From Point A to Point B - Aerial
From Point A to Point F - Drip Torch
From Point B to Point C - Drip Torch
From Point C to Point D - Drip Torch
From Point E to Point F - Aerial

Water tankers and pre-laid fire hoses would be placed at Point B of the North Buffer along the firebreak road for holding and preventing encroachment of fire outside the areas of the burn unit.

Day Seven - South Buffer
Application of Fire Retardant
From Point B to Point A - Aerial
From Point A to Point D - Aerial
From Point B to Point C - Drip Torch
From Point C to Point D - Drip Torch

3.1.2 Alternative 2 - Prescribed Burn Plan 2. Under this Alternative, a total of approximately 324-364 hectares (800-900 acres) would be burned within the north and

south firebreak (Units A and B) and smaller parcels outside the firebreak road (Units C1 and C2) (Figure 5). The conditions would be the same as proposed for Alternative 1 unless specifically identified. The prescribed burn is anticipated to take four days. The sequence and method is described below.

Day One - Unit A
From Point A to Point B - Drip Torch
From Point B to Point C - Drip Torch
From Point E to Point F – Drip Torch
From Point F to Point D, simultaneously with Point E to Point A – Drip Torch
From Point D to Point C – Drip Torch

Day Two - Unit B
From Point A to Point B, simultaneously with Point A to Point G – Drip Torch
From Point B to Point C – Drip Torch
From Point C to Point D – Drip Torch
From Point D to Point E, simultaneously with Point G to Point F – Drip Torch
From Point E to Point F – Drip Torch

Day Three - Application of Fire Retardant
Unit C1: From Point A to Point B
From Point B to Point F
From Point B to Point D

Unit C2: From Point A to Point B
From Point A to Point D

Day Four - Units C1 and C2
Unit C1: From Point B to Point A - Drip Torch
From Point B to Point C - Aerial
From Point A to Point E - Drip Torch
From Point C to Point D - Aerial
From Point E to Point D - Drip Torch

Unit C2: From Point A to Point B - Aerial
From Point A to Point C - Drip Torch
From Point B to Point C - Drip Torch

Water tankers and pre-laid fire hoses would be placed along Points A and B of Unit C1 and Points A and B of Unit C2 for holding and preventing encroachment of fire outside the areas of the burn unit.

While this Alternative does not clear all of the land areas set forth in the Settlement Agreement, it does clear portions within the designated SDZ and 1,000 meter buffer areas and the areas inside of the firebreak roads. Further, this Alternative takes into account the constraints described in the Settlement Agreement by reducing

Figure 5. Burn Plan 2

the fire risks to species protected under the Endangered Species Act as compared to Alternative 1.

3.1.3 Alternative 3 - Prescribed Burn Plan 3. Under Alternative 3, a total of approximately 283 hectares (700 acres) would be burned within the north and south firebreak roads (Figure 6). The prescribed burn would only take place within the firebreak roads and would be done consecutively in small sections. This alternative is similar to the prescribed burns that were routinely conducted in the 1990s. The conditions and methods would be the same as proposed for Alternative 1 for Units A and B unless specifically identified.

The prescribed burn is anticipated to be two days. On the first day, the Army would perform a prescribed burn in Unit A and on the second day, Unit B. Implementation method would be the same as described for Prescribed Burn Plan 1. There would be no prescribed burn in any other units.

This alternative does not encompass all of the land areas set forth in the Settlement Agreement, and burns the smallest area (only the areas within the firebreak roads) as compared to Alternative 1 and Alternative 2. Like Alternative 2, this Alternative would reduce the fire risk to protected species under the Endangered Species Act.

3.2 No-Action Alternative. Under the No-Action Alternative, the U.S. Army would not conduct a prescribed burn to clear vegetation to allow UXO clearance and archaeological surveys as required under the Settlement Agreement. The Army would be unable to comply, in part or full, with the requirements of 6.c. and 8.a. of the Settlement Agreement. The existing fuel load would remain and continue to serve as a fuel source for future military and non-military ignitions.

3.3 Alternatives Considered but Not Carried Forward.

3.3.1 Chemical Treatment Alternative. Another method to control vegetation is the use of herbicides. The choice of chemical treatment depends on the environmental setting, effectiveness on the vegetation in question, consequential effects on native or rare species, and human health and safety. Although chemical treatments may be effective in controlling vegetation, this alternative may not allow the safe UXO removal operations or access into an area where there is suspect UXO because dead vegetative cover would still remain, obscuring ground visibility. Therefore, this alternative was considered non-viable and dismissed from further evaluation.

3.3.2 Mechanical Clearing Alternative. Mowing or cutting down vegetation is an alternative to remove the vegetative cover. However, the terrain at MMR makes this option impractical and unfeasible in some areas. There are many ravines and small sharp inclines that would impede clearing equipment such as mowing tractors and it would be unsafe to personnel to enter these areas. In addition, the mowed material

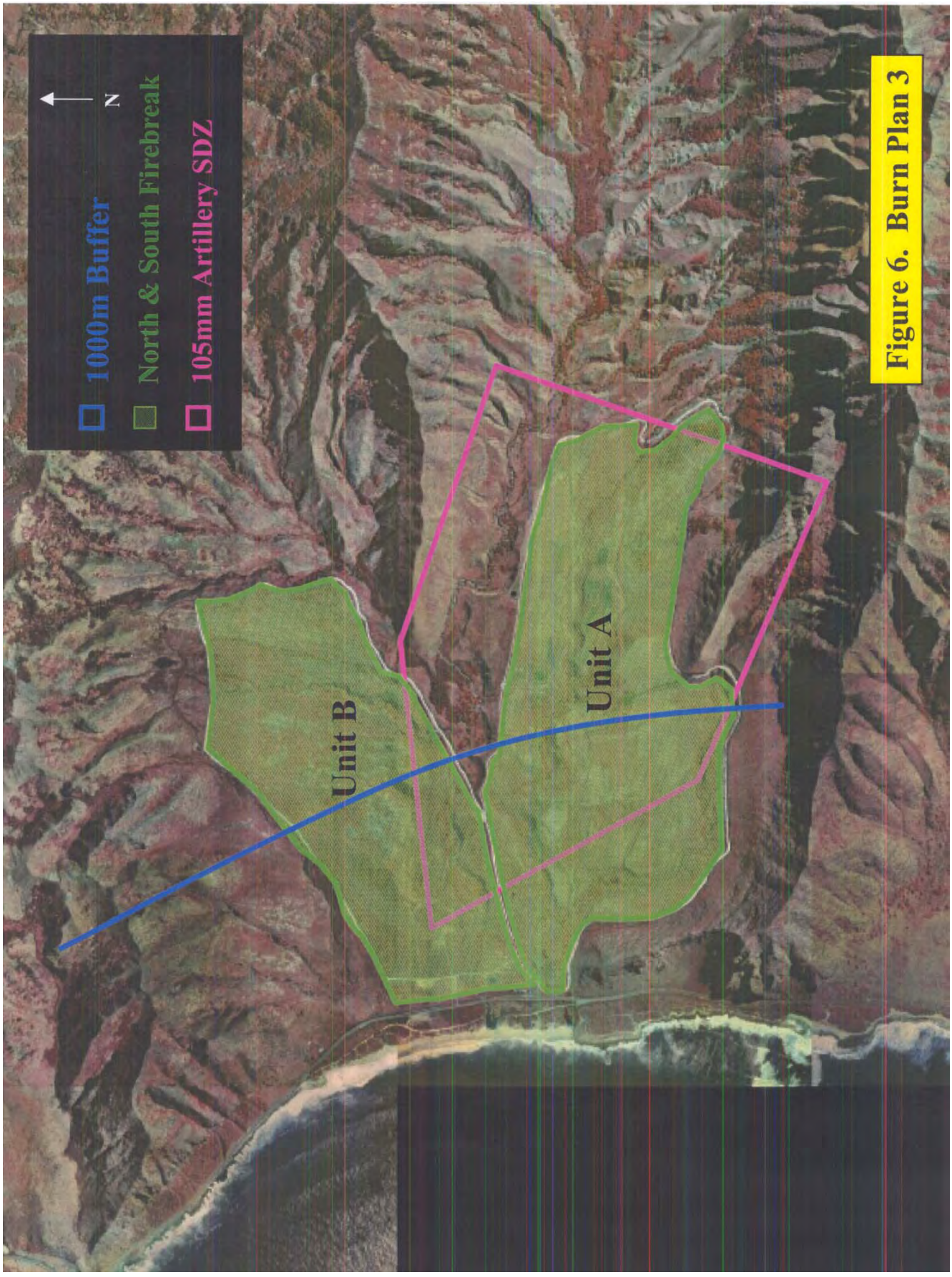


Figure 6. Burn Plan 3

would still remain and obscure visibility. Therefore, this alternative was considered non-viable and dismissed from further evaluation.

4.0 Affected Environment

4.1 Geology & Soils. Makua Military Reservation is located in Makua Valley and is isolated in part by the Waianae Mountains to the north, east, and south, and by the Pacific Ocean to the west. The valley floor varies from 20 to 400 feet (6 to 122 meters) elevation and the mountain range has heights of 2,100 to 2,900 feet (640 to 884 meters).

The Waianae Range is composed of thin basaltic lava flows with few ash flows. The range is divided into the lower/middle and the upper members of the Waianae Volcanic series. The lower/middle members consist of lava of the main shield-building stage. These lavas are primary lavas of great thickness and are composed of tholeiitic basalt, olivine basalt, and oceonite. The upper members consist of late-stage volcanics. They are composed of alkalic olivine basalt, ankaramite, mugearite, hawaiite, and trachtyte. The Coastal Plain materials in Makua Valley consist mainly of noncalcareous, undifferentiated sedimentary materials, except for a narrow strip on the west coast boundary that consists of calcareous sedimentary materials deposited by the ocean. The Makua Valley sediments are underlain by a thick sequence of basalt, with some ash and other volcanic rocks. Surface materials are composed of rocks of the Waianae volcanic series, and of alluvial sediments and marine sands. The central part of the valley is filled with a sequence of alluvium (25th ID (L) and USARHAW 2001a).

Erosion problems are confined to demolition pads, firebreak roads and denuded areas near the top one-third to one-half of the steep gulch walls in Makua Valley (25th ID (L) and USARHAW 2001a). The Army's Integrated Training Area Management (ITAM) program uses land management practices and erosion control measures to stabilize and minimize soil erosion.

4.2 Water Resources. There are no perennial streams on MMR. The Punapohaku Stream, Makua Stream, and Koiahi Gulch are considered intermittent and the spring area in upper Makua Valley is within an exploded ordnance area. (25th ID (L) and USARHAW 2001b).

The Basal Water Body and the Waianae Dike-Impounded Water Body are two types of groundwater on MMR (25th ID (L) and USARHAW 2001a). Fresh water can be found at lower elevations in sedimentary calcareous sands and younger alluvial deposits near the coast but this freshwater supply is limited by low permeability and limited recharge capacity. Fresh water is also found in the upper portions of the valley at the bottom of incised stream channels but this area has low storage capacity. There are no water supply wells at MMR and a monitoring well near the administrative building reached groundwater at 16.3 feet (25th ID (L) and USARHAW 2001a).

4.3 Air Quality. The entire state of Hawaii is an attainment area for all criteria pollutants under the Clean Air Act. The ambient air quality in the MMR area is considered to be good due to strong trade wind conditions and lack of development in the area. Common sources of air pollution in the area are from emissions from transportation sources, dust and dirt from bare soil areas, ocean aero-allergens, pollen from plants, and smoke from munitions and dust from explosions during training exercises (25th ID (L) and USARHAW 2001a). Another source of air pollution in the region (from whatever source) have been wildfires. These wildfires affect air quality by releasing fine particulate matter (ash and dust) and gases (carbon monoxide, carbon dioxide, methane) into the atmosphere.

4.4 Noise. A substantial amount of noise is generated from training and military activities within MMR. These include overflights from helicopters, engine noise from vehicles, explosions and gunfire (25th ID (L) and USARHAW 2000). Noise generated from training activities within Makua would not exceed levels allowed by local noise ordinance and are not expected to significantly impact the surrounding community and users of the nearby Makua Beach (25th ID (L) and USARHAW 2001a.)

4.5 Traffic. The main arterial highway in the Waianae area is Farrington Highway. Farrington Highway is the only road providing ingress and egress to the Waianae coast. The H-1 Freeway becomes Farrington Highway after passing the Kapolei/Makakilo area. It is a four-lane divided highway until it intersects with Makaha Valley Road, then it becomes a two-lane undivided highway until it ends at Keawaula (Kaena Point).

During morning and afternoon peak hours (5:00-9:00 a.m. and 3:00-7:00 p.m.), Farrington Highway becomes congested, limiting its capacity as an arterial road. The segment between Waianae Town and Nanakuli, located south of Makua, experiences severe congestion. Pursuant to the Settlement Agreement, the Army has agreed to limit the transportation of ammunition on Farrington Highway during these peak hours and instead transport by air when possible.

Makua Beach, west of MMR, is open to the general public for use except when such use interferes with training or endangers the public. In these instances, the Army publishes a notice three days prior to the training that restricts public use of the premises and controls traffic over Farrington Highway (25th ID (L) and USARHAW 2001a). Closure of the highway usually does not exceed 15 minutes at a time.

4.6 Hazardous and Toxic Materials. Site assessments and environmental sampling have been performed over several decades and findings included heavy metals, semi-volatile organics, sulfides, nitrates, etc. (25th ID (L) and USARHAW 2001a). Studies are currently being conducted to address concerns per 6.a. of the Settlement Agreement. UXO may be present, especially in areas that have not been previously burned.

4.7 Vegetation and Fuel Loads. The vegetation at MMR have been identified and segregated into eight vegetation classes and one non-vegetated class. The vegetation class consists of grass, grass/shrub, shrub, mixed forest, kukui dominated forest,

vegetated cliffs, savanna, and forest/shrub. The non-vegetated class consists of roads, areas around buildings, and bare soil. The various classes are described below (Beavers et al. 1999):

"*Grass. Alien grasses are generally greater than one meter in height, though grass in areas that have been burned or managed within the past year may be shorter. The principal species are guinea grass (Panicum maximum) and molasses grass (Melinus minutiflora P.). The latter has been known to result in exceptionally high fire intensity, probably due to oils secreted from the base of leaf hairs onto the leaf surfaces. Heavy accumulations of dead biomass, nearing 100 percent of all grass biomass in the dry months, are common in the grass class. Pockets of shrubs, particularly haole koa (Leucaena leucocephala), exist within the grass vegetation class. Virtually no native species are present.*

Grass/Shrub. Alien grasses grow in the understory or are codominant with shrubs. Grass biomass remains high and the influence of the shrubs is in the addition of larger diameter fuels to the fuel matrix as well as a firebrand source for spotting. There is some disagreement among personnel with fire experience at MMR about whether intensity and rate of spread of fires burning from grass into grass/shrub areas is reduced. However, at present, most shrubs (primarily haole koa) in the grass/shrub category have been repeatedly burned in the past several years and are therefore small and probably have little effect on fire behavior, as the grasses will be the primary carrier of the fire.

Shrub. Alien (generally at middle elevations) and native (at higher elevations) shrub species dominate this class. Shrublands tend to occur at middle elevations in scattered patches and at high elevations on ridges unsuitable for the production of a forest stand of full stature. Many areas classified as shrub are occupied by species technically classified as trees that have taken on a shrubby growth form.

Mixed Forest. All tree species, with the exception of kukui (Aleurites moluccana), are included in this class. These forests are heavily dominated by the native species of 'ohi'a (Metersideros polymorpha), wiliwili (Erythrina sanwicensis), and koa (Acacia koa), though areas of alien infestation occur. Forested areas are almost exclusively located above 200 meters. Where forested areas exist below this elevation they are limited to locations with favorable soils, moisture, and aspect.

Kukui Dominated Forest. Kukui (Aleurites moluccana) dominated forest is any area where kukui (Aleurites moluccana) canopy cover is greater than 50 percent. This class of vegetation occurs almost exclusively in moist gullies within the native forest class.

Vegetated Cliffs. This class includes any heavily to lightly vegetated cliff faces with a slope greater than approximately 75 degrees. Vegetation cover ranges from virtually none (in isolated areas) to complete cover of grasses and low stature shrubs. Individual trees are present but uncommon and closed canopy forests are absent.

Savanna. Grasslands with a tree canopy greater than 50 percent fall into this category. Grasses in the understory are consistently of the alien species named above. Tree species include both native and exotic individuals.

Forest/Shrub. Shrublands with a tree canopy greater than 50 percent make up the forest/shrub category. Shrub and tree species include both native and exotic individuals. This vegetation class occurs only in one location along Farrington Highway.

Roads, Areas Around Buildings, and Bare Soil. This class includes roads, buildings and the surrounding landscaped vegetation, and areas with very sparse vegetation. Areas impacted enough by training exercises to remove continuous vegetation cover are included. This category is composed of areas where there is very little risk of fire ignition or spread. Locations that have been mowed and/or burned for fuel management are not included because they represent areas of higher fire ignition and spread risk."

In the 1990s, the Army conducted several routine prescribed burns to reduce fuel loads. These prescribed burns were successfully conducted, with the exception of one in July 1995. The July 1995 prescribed burn escaped through a weak point in the fire retardant line during the burn of Unit C outside of the firebreak roads. Several factors contributed to this one escaped fire. These factors are discussed in more detail in the Environmental Consequences section.

The Army has significantly improved its fire management program with the development of a comprehensive Wildland Fire Management Plan (WFMP). The WFMP continues to be updated when new information and techniques become available to make it more effective. All fire-planning efforts consider impacts of fire pre-suppression and suppression activities on the natural and cultural resources, including rare and endangered species (25th ID (L) and USARHAW 2001a). Since returning to training in the fall of 2002, the Army has conducted 13 CALFEXs to date with no fires escaping the firebreak road.

4.8 Threatened and Endangered Species. The Waianae Mountains are the most biologically diverse region on the island of Oahu. With a great number of habitat types and a larger range of elevations, MMR sustains a wide variety of native and non-native plants and animals. The lower section of Makua consists primarily of non-native species whereas the upper ridges/slopes contain many of the native and federally listed species (34 listed plant and four listed animal species). A list of these plant and animal species is provided in Appendix D.

Fire is recognized as the biggest threat to listed species. There are large gaps in fire information at MMR prior to 1996 because records were incomplete in terms of existence of a record for every fire and the recorded information in the available records (Beavers et al. 1999). Beavers et al. (1999) conducted trend analysis based on 325 available records. Non-military ignitions accounted for 5% of the fires, however, this

may be the greatest fire threat since the timing of military ignitions can be controlled but non-military cannot.

In June 1995, a prescribed burn escaped and destroyed individuals of five listed species (25 ID (L) and USARHAW 2001a). In 1998, the Army initiated formal consultation under Section 7 of the ESA with the USFWS to determine if routine military training at MMR would jeopardize the continued existence of listed species. The USFWS issued a Biological Opinion dated July 23, 1999 concluding that routine military training and the conservation measures identified in the Army's Biological Assessment (BA) would not jeopardize listed species found within the MMR Action Area. The conclusion of the "no jeopardy" was based on certain restrictions to military training, preparation and implementation of a wildland fire management plan, implementation of management actions identified in the BA, and the preparation and implementation of a plan that would identify additional management actions beyond those that the Army was already implementing or agreed to implement in the BA to stabilize specific listed taxa.

The Army requires the following firefighting resources (i.e., personnel, fire vehicles, and equipment and aircraft support) during training exercises per the WFMP (25th ID (L) and USARHAW 2001a):

- *"Trained and qualified firefighting personnel at MMR.*
- *Twenty soldiers from the training unit, immediately available to MMR staff should a fire break out, including a non-commissioned officer to provide unit supervision of the detail.*
- *Qualified aerial fire-bucket-trained helicopter crews.*
- *One operational Hummer brush engine, equipped with 300-gallon slip-on pump unit and one 6x6 water tanker/tender (1,200-gallon capacity). If a Hummer is not available and operational, training would cease until another engine is brought on site.*
- *Backup and extended attack vehicles.*
- *A cache of fire equipment on site at all times and inspected periodically to ensure all resources are in place. Any deficiencies would be identified and immediately corrected.*
- *One aircraft dedicated and physically on site at the helicopter area in front of MMR.*
- *Control during live-fire or use of pyrotechnics, including blank ammunition activities.*
- *One backup aircraft on station at Wheeler Army Airfield or Marine Corps Base Kaneohe Bay, or a general response aircraft. This aircraft must be on standby and have a one-hour response ability while training is being conducted at MMR.*
- *A serviceable primary and a reserve Bambi fire bucket available for use at all times."*

The primary resources for firefighting at MMR are the two dip ponds and the firebreak system. The "lower" dip pond is located 650 feet to the northeast of the Range Division building and the "upper" dip pond is located 6,500 feet east of Range Control

along the firebreak road. The dip ponds are filled to a minimum of 70 percent (above the 7-foot mark) of its maximum capacity prior to any live-fire training. The lower pond is filled using the waterline into MMR while the upper pond is filled by tankers from another off-site location. While the use of freshwater is preferred over the use of sea and brackish water, during extended attack operations, fresh water can become limited. The helicopters can also apply seawater for fire suppression, if required (25th ID (L) and USARHAW 2001a).

The firefighting staff at MMR is supported by several federal agencies. Fire protection services on USARHAW installations are provided by the consolidated Federal Fire Department (FFD), Naval Station Pearl Harbor through an Interservice Support Agreement (ISA). The FFD has historically only been staffed to carry out the structural firefighting mission on Army installations. The Army auxiliary wildland firefighting force was established by Range Division to augment the FFD during wildfires that are first reported on the training ranges and to provide initial attack until the FFD arrives (25th ID (L) and USARHAW 2001a).

The Army installed three Remote Automated Weather Stations and developed a Fire Danger Rating System specific to MMR to determine the type of training allowed and what ammunition can be used under certain conditions (25th ID (L) and USARHAW 2001a).

Vegetation control by mowing within the southern firebreak is primarily centered in the accessible areas of the CCAAC. In addition to mowing operations, a general herbicide Roundup® (Glyphosate) is applied to destroy vegetation growing along fencelines, on road shoulders, and the firebreak road.

4.9 Historic and Archaeological Resources. MMR is an area rich in historical, cultural and archaeological resources (25th ID (L) and USARHAW 2001b). Among the archeological sites that have been documented are house platforms, walls, agricultural terraces, heiau, and shrines (Figure 7 and Table 1) (Pacific Cooperative Studies Unit, 2001). Ukanipo Heiau was listed on the National Register of Historic Places in 1983. Surveys at MMR are only 30% complete and recovery of additional sites are slow due to potentially hazardous conditions, primarily caused by the presence of UXO hidden by surrounding grasses and brush.

Although the greatest threat to cultural resources and archaeological sites at MMR is damage caused by explosive ordnance, damage can also be caused by resource management or military personnel climbing and walking on sites (25th ID (L) and USARHAW 2001b). Pursuant to the Army's Programmatic Agreement dated September 2000 under NHPA and concern over cultural resources at MMR, the Army must document the condition of cultural sites after each CALFEX for the first year and quarterly thereafter.

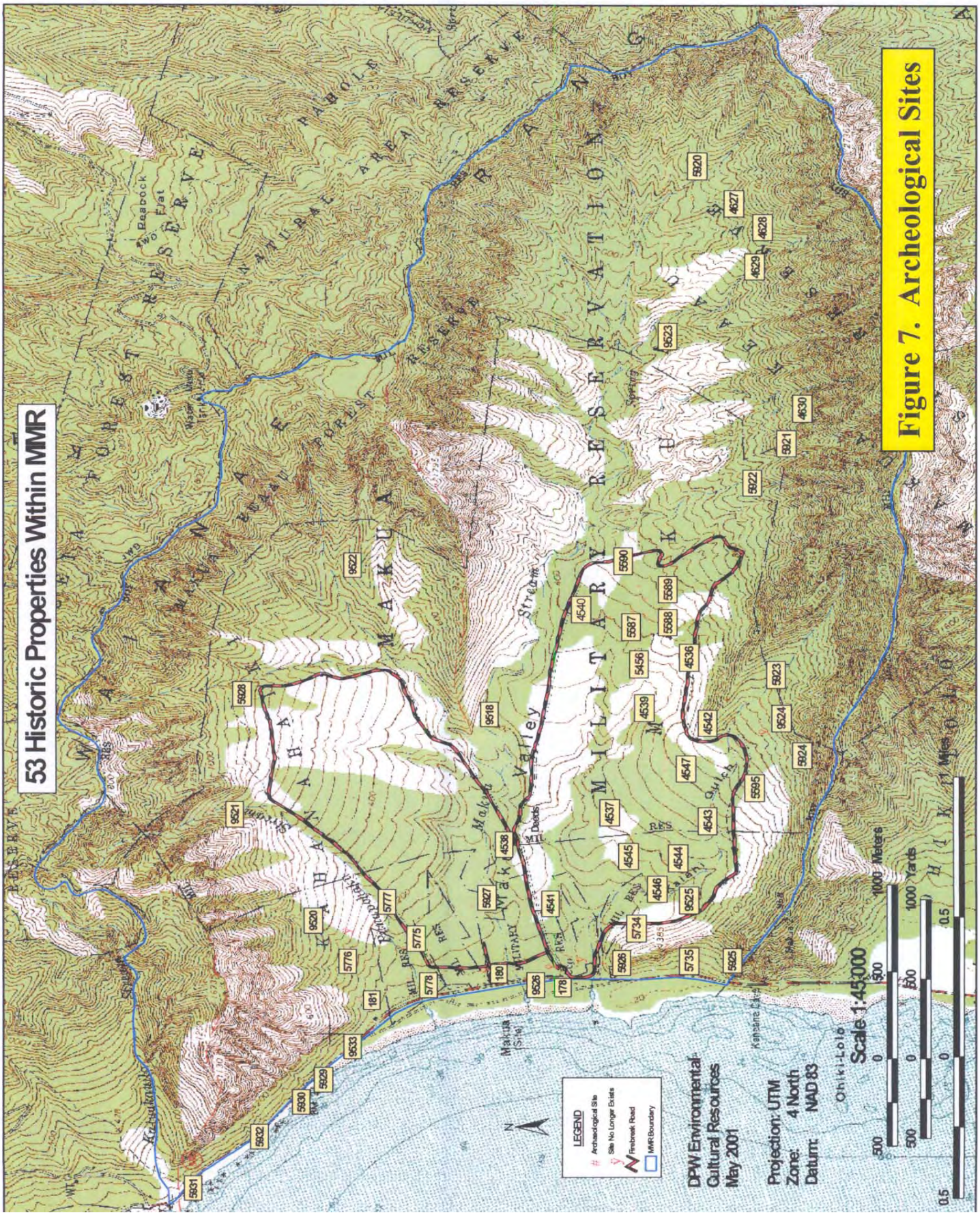

53 Historic Properties Within MMR
Figure 7. Archeological Sites
LEGEND
Archaeological Site
Site No Longer Exists
Firebreak Road
MMR Boundary
DPW Environmental
Cultural Resources
May 2001
Projection: UTM
Zone: 4 North
Datum: NAD 83
Scale 1:48000
1000 Meters
1000 Yards
0.5 Miles
WAIANAE KUAOLA FOREST RESERVE
MAKUA MILITARY RESERVATION
KAENA POINT NATURAL AREA RESERVE
Makua Valley
Makua Beach
Kaena Point
Ohikilolo

Table 1. Archaeological Sites Within MMR as of May 2001

	State Site #	Formal Type	Reference	Status
1	50-80-03-178	heiau	Thrum 1906	destroyed (by 1906)
2	50-80-03-180	heiau	Thrum 1906	destroyed (by 1906)
3	50-80-03-181	heiau	Thrum 1906	located
4	50-80-03-4536	walls/well	Eble et al. 1993	hazardous location
5	50-80-03-4537	mounds/wall	Eble et al. 1993	located
6	50-80-03-4538	encl. and C-shape	Eble et al. 1993	located
7	50-80-03-4539	retaining wall	Eble et al. 1993	located
8	50-80-03-4540	complex	Eble et al. 1993	hazardous location
9	50-80-03-4541	walls	Eble et al. 1993	located
1	50-80-03-4542	ag/hab complex	Eble et al. 1993	located
11	50-80-03-4543	complex	Eble et al. 1993	located
12	50-80-03-4544	complex	Eble et al. 1993	located
13	50-80-03-4545	complex	Eble et al. 1993	located
14	50-80-03-4546	encl./platform	Eble et al. 1993	located
15	50-80-03-4547	complex	Eble et al. 1993	located
16	50-80-03-4627	complex	Carlson et al. 1996	hazardous location
17	50-80-03-4628	mound	Carlson et al. 1996	hazardous location
18	50-80-03-4629	mounds	Carlson et al. 1996	hazardous location
19	50-80-03-4630	complex	Carlson et al. 1996	located
20	50-80-03-5456	imu complex	Williams et al. 1998	located
21	50-80-03-5587	housesite	Williams et al. 1998	hazardous location
22	50-80-03-5588	terrace	Williams et al. 1998	hazardous location
23	50-80-03-5589	terrace/platform	Williams et al. 1998	hazardous location
24	50-80-03-5590	terr/mnd	Williams et al. 1998	hazardous location
25	50-80-03-5595	wall/enclosure	Williams et al. 1999	located
26	50-80-03-5734	temp shelter?	Williams et al. 1999	located
27	50-80-03-5735	core/flakes	Williams et al. 1999	located
28	50-80-03-5775	ag/hab complex	Cleghorn et al. 2000	newly recorded
29	50-80-03-5776	ag/hab complex	Cleghorn et al. 2000	newly recorded
30	50-80-03-5777	mound	Cleghorn et al. 2000	newly recorded
31	50-80-03-5778	encl./mounds	Cleghorn et al. 2000	newly recorded
32	50-80-03-5920	ag complex	DPW 2001	new
33	50-80-03-5921	ag complex	DPW 2001	new
34	50-80-03-5922	ag complex	DPW 2001	new
35	50-80-03-5923	kuleana complex	DPW 2001	new
36	50-80-03-5924	ag features	DPW 2001	new
37	50-80-03-5925	ag complex	DPW 2001	new
38	50-80-03-5926	complex	DPW 2001	new
39	50-80-03-5927	kuleana walls	DPW 2001	new
40	50-80-03-5928	ag wall	DPW 2001	new
41	50-80-03-5929	military complex	DPW 2001	new
42	50-80-03-5930	2 platforms	DPW 2001	new
43	50-80-03-5931	wall	DPW 2001	new
44	50-80-03-5932	path	DPW 2001	new
45	50-80-03-9518	trail	Rosendahl 1977	located
46	50-80-03-9520	walls/enclosure	Rosendahl 1977	superseded
47	50-80-03-9521	terraces	Rosendahl 1977	hazardous location

48	50-80-03-9522	terraces/walls	Rosendahl 1977	hazardous location
49	50-80-03-9523	complex	Rosendahl 1977	hazardous location
50	50-80-03-9524	complex	Rosendahl 1977	superseded
51	50-80-03-9525	wall	Rosendahl 1977	located
52	50-80-03-9526	occ. complex	Rosendahl 1977	superseded
53	50-80-03-9533	platform	Rosendahl 1977	located

Over the years, the Army has allowed limited access to the public at Makua. Pursuant to the Settlement Agreement, the Army must allow cultural access to sites on Makua, twice a month and two overnight sessions a year. Army escorts are provided to these groups to ensure that no damage is done to cultural sites.

4.10 Land Use. In the 19th century, land use at MMR was mainly for agriculture, cattle ranching, and rural settlement (25th ID (L) and USARHAW 2001a). Established in 1943, MMR originally was comprised of more than 2,954 hectares (7,300 acres). Since then, the Army's holdings have been reduced to 1,696 hectares (4,191 acres). Of the Army's current holdings, 168 hectares (170 acres) are owned in fee, 1,310 hectares (3,237 acres) are State of Hawaii ceded lands, 317 hectares (782 acres) are leased from the State of Hawaii, and 0.7 hectares (1.6 acres) are held by license. Although the Army maintains jurisdiction over 1,696 hectares, only 419 hectares (1,034 acres) are used for training and associated support activities. Of those 419 hectares, the maneuver live-fire area is only 185 hectares (457 acres); the remaining land area is maintained and serves as a buffer zone that supports rare and listed species and cultural resources.

4.11 Socioeconomic Environment. MMR is considered a part of the Waianae District. In 1950, the population of the Waianae District was 7,000 people, or 2% of the total population on Oahu. However, in 1998, the population increased to 40,000 people, or 4.5% of Oahu's total population. It is anticipated that future growth will continue and add 10,000 to 20,000 people by 2020 (25th ID (L) and USARHAW 2001a).

The Waianae community today has a large minority and low-income population. Over 78 percent of the community is classified as ethnic minority. The median household income was $32,392 as compared to $40,581 for Oahu. Some 24.1 percent of families and 23.9 percent of individuals were below the poverty line in Waianae, compared to 3.2 percent and 2.8 percent, respectively, on Oahu.

Recreation areas in the vicinity of Makua include Makua Beach and other shoreline areas along Farrington Highway to Kaena Point, where the paved highway ends.

There are seven people employed at MMR who provide security and fire protection. Public access to MMR is restricted for safety and security reasons, although cultural access is allowed twice a month and overnight sessions two times per year.

4.12 Environmental Justice and Protection of Children. MMR is located in Honolulu County, Hawaii and census data shows that Honolulu County has a total of 876,156 persons in the 2000 census (25th ID (L) and USARHAW 2001b). Of the 876,156

persons, Asians are the predominant race (46%). Minority populations as defined are African American (2.4%), American Indian (<1%), Asian (46%) and Pacific Islanders (8.9%), and Hispanics (0%).

Approximately 11.9% of the population in Hawaii is considered low income based on the average percent of persons in poverty from 1997-1999 (25th ID (L) and USARHAW 2001b). Low income populations are defined as persons at or below the poverty level.

5.0 Anticipated Environmental Consequences and Mitigation

5.1 Geology & Soils.

5.1.1 Alternative 1 - Prescribed Burn Plan 1: Under Alternative 1, the total acreage burned would be the largest (485-607 hectares). Soils would become charred; however, the intensity of the burn would not be high enough to significantly or permanently affect the soils. Previous burns conducted in the same manner do not appear to have impacted soils as these areas continue to support new vegetation. Soils would be exposed once cover is removed which would increase the potential for soil erosion to occur. However, based on past observations, new vegetation arises within one month depending on weather conditions. Impacts to geology and soils would be short-term and temporary. Thus, there would be no significant impacts to geology and soils.

5.1.2 Alternative 2 - Prescribed Burn Plan 2. The impacts of this alternative would be the same as for Alternative 1, although the total acreage affected would be less (324-364 hectares).

5.1.3 Alternative 3 - Prescribed Burn Plan 3. The impacts of this alternative would be the same as for Alternative 1, although the total acreage affected would be less than Alternatives 1 and 2 (283 hectares).

5.1.4 No Action: No impacts are anticipated, as the existing conditions would remain.

5.2 Water Resources.

5.2.1 Alternative 1 - Prescribed Burn Plan 1. Streams in the area are intermittent and are usually dry during the time a prescribed burn would be conducted. In addition to these streams, several possible palustrine wetlands or *muliwai* ponds have also been identified at the end of these streams across Farrington Highway. The surrounding native trees, shrubs or persistent emergents that encompass the periphery of these areas are characteristics of these *muliwai*, however, these wetlands have neither been verified nor delineated at MMR (25th ID (L) and USARHAW 2001b).

Chemicals proposed for use are considered "environmentally safe" (see 5.6 Hazardous and Toxic Materials for detailed discussion). No significant impacts on water resources are anticipated.

5.2.2 Alternative 2 - Prescribed Burn Plan 2. The impacts would be the same as for Alternative 1.

5.2.3 Alternative 3 - Prescribed Burn Plan 3. The impacts would be the same as for Alternative 1.

5.2.4 No Action: No impacts are anticipated, as the existing conditions would remain.

5.3 Air Quality.

5.3.1 Alternative 1 - Prescribed Burn Plan 1. Air quality impacts are expected to be short-term and temporary. As a result of the burn, small amounts of fine particulate matter and gases would be released into the atmosphere (e.g., ash, dust, carbon monoxide, and carbon dioxide). Local visibility in the immediate vicinity may be impaired by smoke or haze for the duration of the controlled burn. However, due to MMR's distant location from urban areas, the burn operations should not create a significant impact to the public. Recent wildfires, such as the one on August 2, 2002 near Kaneana Cave, have resulted in some temporary and localized air quality impacts.

The Army has coordinated with the State of Hawaii, Department of Health (DOH), Clean Air Branch and obtained approval for the burn (Appendix E). DOH approved the prescribed burn pursuant to Hawaii Administrative Rules (HAR), Section 11-60.1-52, paragraph (b)(6) and requested that no burns occur during a no-burn period as provided in HAR Section 11-60.1-55. The no-burn period as defined HAR 11-60.1-55 is determined by the Director when (1) meteorological conditions have resulted in a widespread haze on any island or in any district on the island; and (2) smoke from another/any adjacent district may impact on the affected district; or when a rise of the carbon monoxide level exceeds five mg/m^3 for an eight-hour average or the PM_{10} level exceeds 150 ug/ m^3 for 24 hours. The Army will implement the mitigation measures and no significant impact is anticipated.

MITIGATION: The Army will call the City and County of Honolulu Fire Department or the Clean Air Branch prior to the prescribed burn to ensure compliance with HAR Section 11-60.1-55. The Army will also notify the Clean Air Branch if a change is made to scheduled date of the prescribed burn.

5.3.2 Alternative 2 - Prescribed Burn Plan 2. Anticipated impacts would be similar to Alternative 1 but there would be less impact to the environment because the proposed burn area is smaller and the number of days anticipated to complete the prescribed burn is less.

The Army has coordinated with the State of Hawaii, Department of Health (DOH), Clean Air Branch and obtained approval for the burn (Appendix E). DOH approved the prescribed burn pursuant to Hawaii Administrative Rules (HAR), Section 11-60.1-52, paragraph (b)(6) and requested that no burns occur during a no-burn period as provided in HAR Section 11-60.1-55. The Army will implement the mitigation measures and no significant impact is anticipated.

MITIGATION: Same as the Alternative 1.

5.3.3 Alternative 3 - Prescribed Burn Plan 3. Anticipated impacts would be similar to but less than Alternatives 1 and 2. This alternative proposes to burn the smallest acreage and the anticipated number of days to complete the burn is the least.

The Army has coordinated with the State of Hawaii, Department of Health (DOH), Clean Air Branch and obtained approval for the burn (Appendix E). DOH approved the prescribed burn pursuant to Hawaii Administrative Rules (HAR), Section 11-60.1-52, paragraph (b)(6) and requested that no burns occur during a no-burn period as provided in HAR Section 11-60.1-55. The Army will implement the mitigation measures and no significant impact is anticipated.

MITIGATION: Same as the Alternative 1.

5.3.4 No Action. No impacts are anticipated, as the existing conditions would remain.

5.4 Noise.

5.4.1 Alternative 1 - Prescribed Burn Plan 1. The activities associated with implementing a prescribed burn would generate periodic noise primarily from helicopters and firefighting vehicles. Interior sections within the Units A and B that may need to be burned would require the use of an Aerial Ignition Device (AID) to be deployed from a helicopter. Helicopters would also be used to apply fire retardants. Firefighting vehicles, on standby, would be stationed near the cantonment area. Noise impacts would be short-term and no significant impacts are anticipated.

5.4.2 Alternative 2 - Prescribed Burn Plan 2. The impacts of this alternative would be similar to Alternative 1 but there would be less impact to the environment than Alternative 1. Helicopter noise generated from activities associated with burn would be shorter in duration because the anticipated days to complete the burn, area requiring AID and retardant, would be less. No significant impact is anticipated.

5.4.3 Alternative 3 - Prescribed Burn Plan 3. The impacts of this alternative would be similar to but less than the impacts of Alternatives 1 and 2. There would be no need for a helicopter to apply the retardant and a helicopter may be used if AID is required. No significant impact is anticipated.

5.4.4 No Action. No impacts are anticipated, as the existing conditions would remain.

5.5 Traffic.

5.5.1 Alternative 1 - Prescribed Burn Plan 1. Vehicular traffic would temporarily be disrupted should smoke from the burn obscure visibility. This impact would be short-term and no adverse long-term effect is anticipated. Fire-fighting vehicles would be stationed within the MMR complex. A safety concern to both motorists and recreational users (e.g. fishermen, boaters, etc.) would be the potential for UXO to detonate and shrapnel (fragments) from the explosion injuring people or damaging vehicles. To reduce potential impacts, the Army will implement the mitigation measure and no significant impact on traffic is anticipated.

MITIGATION: Advance notice of burn dates and times will be announced through the various news medias and road signs placed along the H1 Freeway and Farrington Highway, for a week prior to and during burning operations, to inform people intending to utilize shoreline areas in the Makua area for fishing or other ocean activities. In addition, for prescribed burns in the North and South buffer areas (close to Farrington Highway), the Department of Land and Natural Resources (DLNR) will be notified to alert recreational users of the safety concerns.

5.5.2 Alternative 2 - Prescribed Burn Plan 2. The anticipated impacts would be the same as for Alternative 1 but shorter in duration because the number of anticipated days to complete the burn and the burn area would be less.

MITIGATION: Same as for the Alternative 1, except for notification to DLNR.

5.5.3 Alternative 3 - Prescribed Burn Plan 3. Vehicular traffic would temporarily be disrupted should smoke from the burn obscure visibility. This impact would be short-term and no adverse long-term effect is anticipated. Fire-fighting vehicles would be stationed within the MMR complex. The anticipated impacts would be shorter in duration because the number of anticipated days to complete the burn and the burn area would be the least.

MITIGATION: Same as for the Alternative 2.

5.5.4 No Action. No impacts are anticipated, as the existing conditions would remain.

5.6 Hazardous and Toxic Materials.

5.6.1 Alternative 1 - Prescribed Burn Plan 1. The activities associated with the prescribed burn would use Roundup®, drip torch fuel, a fire retardant, and an AID.

Glyphosate, an active ingredient in the weed killer Roundup®, is slight to moderately toxic to fish and practically non-toxic to avian species and honeybees. Studies of the active ingredient in this product indicate that it is rapidly absorbed in the soil, readily biodegrades in soil and water, and does not bioaccumulate. A Material Data Safety Sheet (MSDS) on glyphosate can be found at Appendix F.

Fuel used for the drip torches consist of a mixture of diesel and gas and are anticipated to be consumed in the fire and no residual fuel would remain after the fire. Short-term negative impacts to the environment could result from a spill or unplanned release of fuels used in igniting the prescribed fires.

The fire retardant, Fire Trol® Liquid Concentrate Retardant, would be applied in specific areas to help control the flames from spreading into areas not designated as burn areas. Fire Trol® is used by the U.S. Forest Service for wildland fires throughout the United States, and has been used in previous prescribed burns at MMR. Fire Trol® is considered "environmentally safe" and is biodegradable. A MSDS for this product can be found at Appendix G.

An AID would be used to support ignition efforts, as necessary. These "ping pong ball" spheres contain potassium permanganate, a strong oxidizing agent and ethylene glycol, an ingredient in antifreeze. MSDS for both products can be found at Appendix H. These products have also been used by the U.S. Forest Service for wildland fires and are considered "environmentally safe."

It is unknown whether UXO present would detonate during the burn. Detonation is dependent on various factors such as munition type and fire intensity; however, there is a potential for detonation.

The Army will implement the mitigation measures to reduce potential impacts to the environment and no significant impacts are anticipated.

MITIGATION: The products will be used and stored in accordance with the manufacturer's instructions. Appropriate spill response equipment will be available at storage and transfer sites and fire extinguishing equipment/media will be kept on hand in case of accidental ignition. The Army will also conduct daily operational and safety briefings to prevent accidents and injuries to personnel involved with the prescribed activities. In addition, the Army will implement mitigation as described in "5.5 Traffic" as a precautionary safety measure for the public.

5.6.2 Alternative 2 - Prescribed Burn Plan 2. The impacts of this alternative would be similar to but less than Alternative 1 because the area requiring AID and retardant would be less.

MITIGATION: Same as for the Alternative 1.

5.6.3 Alternative 3 - Prescribed Burn Plan 3. The impacts of this alternative would be similar to but less than Alternatives 1 and 2. Ignition would be mainly from use of drip torches and no retardant is proposed for use. However, an AID may be used, if needed.

MITIGATION: The products will be used and stored in accordance with the manufacturer's instructions. Appropriate spill response equipment will be available at storage and transfer sites and fire extinguishing equipment/media will be kept on hand in case of accidental ignition. The Army will also conduct daily operational and safety briefings to prevent accidents and injuries to personnel involved with the prescribed activities.

5.6.4 No Action: No impacts are anticipated, as the existing conditions would remain.

5.7 Vegetation and Fuel Loads

Although the Army conducted several routine prescribed burns to reduce fuel loads since the 1990s, one fire escaped a weak point in the fire retardant line during the burn of Unit C1 in July 1995. Factors that contributed to this escape were:

a. Inadequate concentration of the fire retardant (lower than normal concentration of fire retardant). Although the concentration was less than normal, the Army made a decision to continue the burn because it was determined that the retardant could possibly hold and if encroachment should occur, the area could be reinforced with foam application from the helicopters.

b. Failure to follow the burn plan prescription of having only one unit burning at any one time (a fire was started in a small area of the lower portion of Unit A that did not burn the day before while a second fire was started in Unit C). This action resulted in two fires to burn simultaneously and separated firefighting resources.

c. Helicopter mechanical problems. Although there were two helicopters on site, one of the two helicopters experienced a mechanical problem during fire suppression activities which left one helicopter to control the fire. The helicopter on standby at Wheeler Army Airfield was activated, however, the size and complexity of the escaped fire eventually exceeded the available firefighting resources.

d. Low level of experienced pilots and aircrew conducting helicopter fire bucket application techniques. The military helicopter pilots had received formal training on fire application techniques from the U.S. Forest Service the week prior to the burn, however, the low level of experience may have contributed to their inability to contain and control the fire.

Since 1995, the Army has made significant improvements at MMR for its WFMP as described in "4.8 Threatened and Endangered Species."

5.7.1 Alternative 1 - Prescribed Burn Plan 1. Under this Alternative, a total of approximately 485-607 hectares (1,200-1,500 acres) would be burned within the north and south firebreak roads and areas outside the firebreak road, including the SDZ and 1,000 meter buffer areas, as outlined in the Settlement Agreement. The impacts of this alternative would burn or scorch the majority of the vegetation. Portions of the 1,000-meter buffer areas contain endangered plant species. Although fire retardant could be placed around these species, there is an extremely high risk that these species would perish or be damaged by heat or escaped fire during the burn. Grasses and non-native species are quick to recover and as in the past, grow back within one month under certain conditions. Even with the implementation of mitigation measures, this Alternative has the potential for significant impact to listed species and will require formal consultation with USFWS (Appendix I).

MITIGATION:

a. The Army will apply a primary and secondary fire retardant containment line for north and south buffers and SDZ zones. The purpose of the secondary line ensures a second line of defense in the event of fire escape from the primary line. The fire retardant lines will be tied in or anchored to established or improved roads.

b. A representative from the fire retardant manufacturer will be on site to ensure that required concentration ratios are adequately mixed and applied properly and a refractometer will be utilized to determine proper concentration.

c. The Army will strictly adhere to all elements outlined in the prescribed burn plan. Prior to ignition, prescription elements will be evaluated individually and collectively, against local weather forecasts and any other predicted conditions. Should any element fail to meet or exceed the limits, the prescribed burn will be suspended until all elements can be satisfied. Also, the Army will make arrangements to have personnel from the U.S. Forest Service provide oversight of the proposed prescribed burn.

d. The Army will have one helicopter devoted to AID, and two helicopters on-site and one at Wheeler Army Airfield devoted to firefighting purposes.

e. All Army personnel directly involved with the prescribed burn will receive firefighter and helicopter fire bucket certification. Military helicopter pilots and aircrew will attend an approved training program that includes, but is not limited to, fire behavior, tactics and bucket operations, aircraft performance considerations and planning, aircrew communications and coordination, and flight training and evaluation that focuses on water drops in mountainous terrain as well as water bucket pickup maneuvers over water reservoirs and open ocean.

5.7.2 Alternative 2 - Prescribed Burn Plan 2. Under this Alternative, a total of approximately 324-364 hectares (800-900 acres) would be burned within the north and south firebreak (Units A and B) and smaller parcels outside the firebreak road (Units C1 and C2). The impacts of this alternative would be less than Alternative 1 because there are no known threatened or endangered species in this burn area. However, if there were an escaped fire, there are listed species outside the burn units, further into Makua Valley and in the 1,000 meter buffer area. No significant impacts are anticipated with the implementation of the mitigation measures.

MITIGATION:

a. The Army will apply a primary and secondary fire retardant containment line for Units C1 and C2. The purpose of the secondary line ensures a second line of defense in the event of fire escape from the primary line. The fire retardant lines will be tied in or anchored to established or improved roads. Unit C1 is a smaller burn unit than the Unit C area in 1995.

b. A representative from the fire retardant manufacturer will be on site to ensure that required concentration ratios are adequately mixed and applied properly and a refractometer will be utilized to determine proper concentration.

c. The Army will strictly adhere to all elements outlined in the prescribed burn plan. Prior to ignition, prescription elements will be evaluated individually and collectively, against local weather forecasts and any other predicted conditions. Should any element fail to meet or exceed the limits, the prescribed burn will be suspended until all elements can be satisfied. Also, the Army will make arrangements to have personnel from the U.S. Forest Service provide oversight of the proposed prescribed burn.

d. The Army will have one helicopter devoted to AID, and two helicopters on-site and one at Wheeler Army Airfield devoted to firefighting purposes.

e. All Army personnel directly involved with the prescribed burn will receive firefighter and helicopter fire bucket certification. Military helicopter pilots and aircrew will attend an approved training program that includes, but is not limited to, fire behavior, tactics and bucket operations, aircraft performance considerations and planning, aircrew communications and coordination, and flight training and evaluation that focuses on water drops in mountainous terrain as well as water bucket pickup maneuvers over water reservoirs and open ocean.

5.7.3 Alternative 3 - Prescribed Burn Plan 3. Under Alternative 3, a total of approximately 283 hectares (700 acres) would be burned within the north and south firebreak roads and affect non-native grasses and haole koa. This plan is most similar to the routine maintenance burns that were conducted at MMR in the 1990s. No significant impacts are anticipated with the implementation of the mitigation measures.

MITIGATION: Same as for Alternative 2 except for a. and b. The Army will not apply primary and secondary retardant lines because Units A and B are circumscribed by the firebreak road.

5.7.4 No Action. Existing conditions would remain and the Army would not be able to clear UXOs and conduct archaeological surveys as stipulated in the Settlement Agreement. Grasses and shrubs would continue to grow taller and obscure UXOs and also may be accidentally or maliciously ignited, creating a fire hazard. Although the Army performs limited fuels management (mowing and herbiciding) within the south firebreak, the potential fire risk to listed species would remain because the high fuel load would still remain.

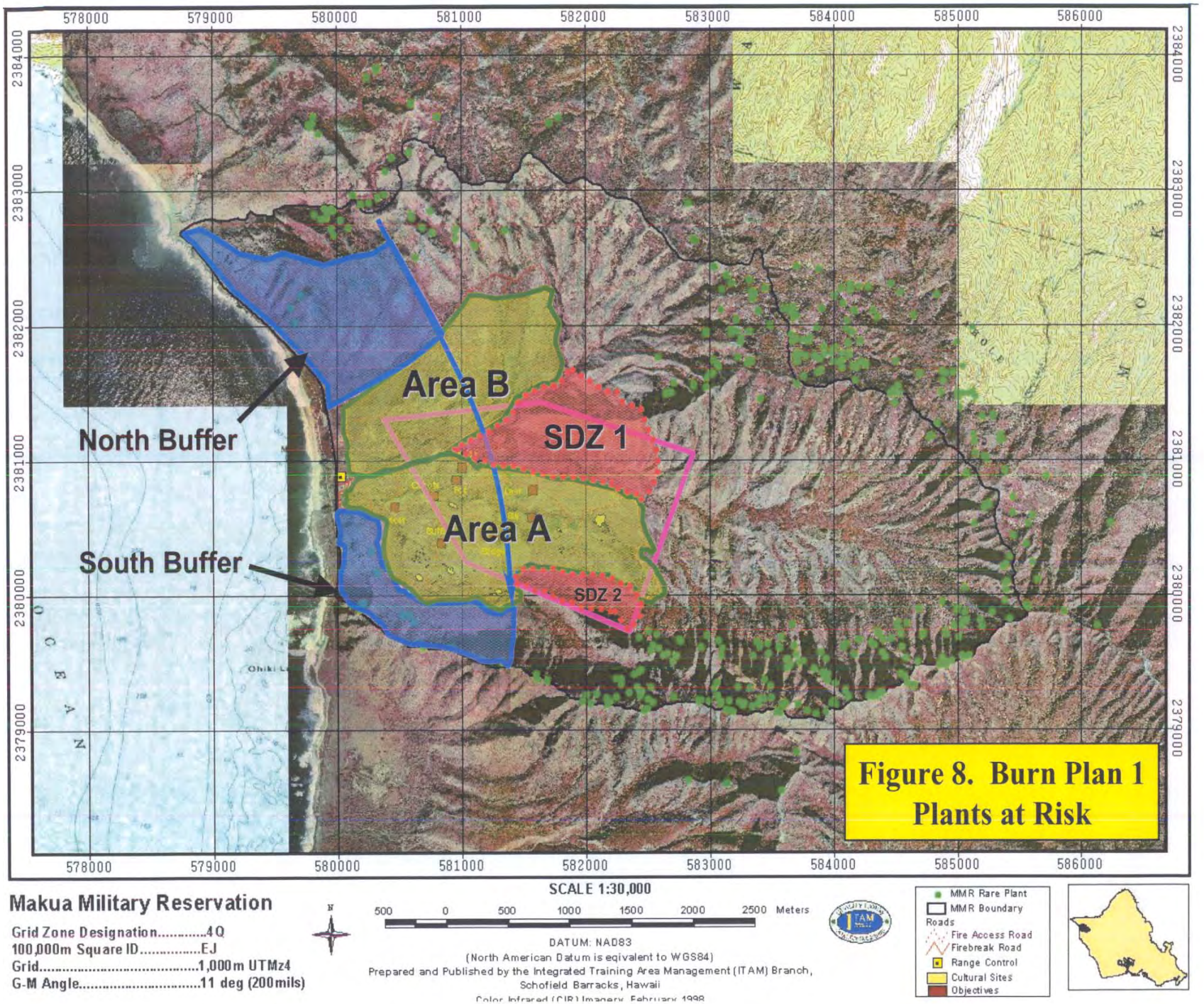
5.8 Threatened and Endangered Species

5.8.1 Alternative 1 - Prescribed Burn Plan 1. Implementation of Alternative 1 would result in the burning of non-native grasses and other vegetation, primarily guinea grass (*Panicum maximum*) and haole koa (*Leucaena leucocephala*). This impact would be short-term and temporary as these non-native species have the capability for re-growth as observed from previous fires. However, there is a potential for wildfire to escape during a prescribed burn as shown in the 1995 incident when the Army performed a prescribed burn that went beyond the firebreak and burned individuals of five listed species.

Alternative 1 proposes to remove the most surface vegetation of the three alternatives. The proposed burn area consists of 485-607 hectares and includes Units A and B which are within the north and south firebreak road perimeters, the 105 mm artillery SDZ, and the 1000 meter buffer zone that borders Farrington Highway.

Although Burn Plan 1 would accomplish the requirements of Section 6.c. and 8.a. of the Settlement Agreement in terms of land area covered, it does not take into account the limitations associated with Endangered Species Act compliance. Specifically, under this Alternative the fire would destroy listed plant species located within the North and South buffer areas and pose the most threat because of its close proximity to the biologically rich areas (Figure 8). There is no incidental take for plants and the Army would violate the Endangered Species Act. In addition, any fire that escapes the burn areas described in Alternative 1, specifically the North and South buffer and SDZ areas would be difficult to control because of the close proximity to the biologically rich areas and terrain. The steep surrounding terrain and high elevations limit accessibility and effectiveness of burn control.

The Army has consulted with USFWS and it has determined that formal consultation will be required because this Alternative poses a significant risk to listed species and designated and proposed critical habitats (Appendix I).


Area B
SDZ 1
Area A
SDZ 2
North Buffer
South Buffer
Figure 8. Burn Plan 1
Plants at Risk
Makua Military Reservation
Grid Zone Designation.....4Q
100,000m Square ID.....EJ
Grid.....1,000m UTMz4
G-M Angle.....11 deg (200mils)
SCALE 1:30,000
500 0 500 1000 1500 2000 2500 Meters
DATUM: NAD83
(North American Datum is eqivalent to WGS84)
Prepared and Published by the Integrated Training Area Management (ITAM) Branch,
Schofield Barracks, Hawaii
Color Infrared (CIR) Imagery, February 1998
MMR Rare Plant
MMR Boundary
Roads
Fire Access Road
Firebreak Road
Range Control
Cultural Sites
Objectives

5.8.2 Alternative 2 - Prescribed Burn Plan 2. Implementation of this alternative would result in similar impacts but to a lesser degree than Alternative 1 because the area to be burned would be smaller and would not have the same high risk of destruction of listed species. Instead of burning the entire 1000 meter buffer and 105 mm SDZ, the size of these burn areas has been reduced to smaller, more manageable area (Units C1 and C2) which are both located directly north and adjacent to Units A and B respectively (Figure 9). Unlike Burn Plan 1, threatened and endangered plants in Burn Plan 2 are *outside* and are at a greater distance from the described burn areas. The same risks for fire escape and management for Alternative 1 also exist for this alternative, however, the smaller burn area and additional precautions (primary and secondary retardant lines) would minimize risk to nearby plant and animal habitats.

Based on the Prescribed Burn Plan for this Alternative, and the additional mitigation measures described in "5.7. Vegetation and Fuel Loads, Alternative 2," the USFWS concurs that this Proposed Action is not likely to adversely affect listed endangered or threatened species or designated or proposed critical habitats (Appendix I).

5.8.3 Alternative 3 - Prescribed Burn Plan 3. The anticipated impacts would be the same but less than Alternatives 1 and 2 because the area to be burned would be the smallest. This alternative proposes to remove vegetative ground cover on 700 acres within Units A and B only and complies the least with the Settlement Agreement. However, it is the safest alternative proposed because of fire-fighting considerations (i.e., terrain, accessibility) and distance from listed species.

Ultimately, the prescribed burn would also serve to protect listed species and native habitat found on ridges of the valley by minimizing the opportunity for a wildland fire to escape during Army training, especially live-fire training, and accidental non-military fires (Figure 10).

Based on the Prescribed Burn Plan for this Alternative, and the additional mitigation measures described in "5.7. Vegetation and Fuel Loads, Alternative 3," the USFWS concurs that this Proposed Action is not likely to adversely affect listed endangered or threatened species or designated or proposed critical habitats (Appendix I).

5.8.4 No Action. No impacts are anticipated, as the existing conditions would remain. However, the vegetative cover would still exist and continue to be a fuel for a wildland fire that may directly impact listed species and designated and proposed critical habitats (Appendix I).

5.9 Historic and Archaeological Resources

Cultural resources generally are not vulnerable to damage by fire itself but could be damaged by suppression activities. Fires of low intensity and duration are characteristic of grassy fuels that dominate the training areas at Makua and usually do

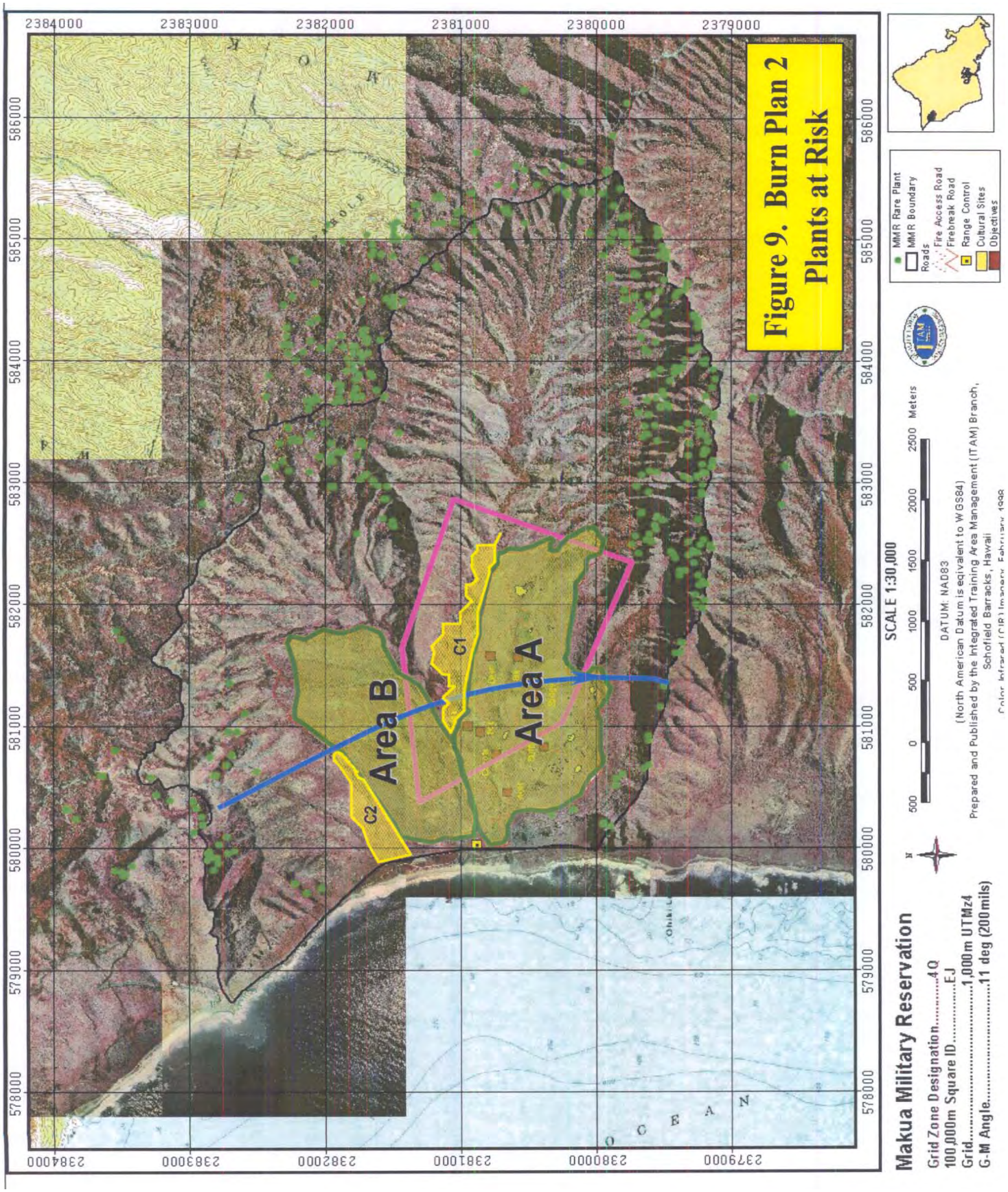


Figure 9. Burn Plan 2
Plants at Risk
Area A
Area B
C1
C2
OCEAN
MMR Rare Plant
MMR Boundary
Roads
Fire Access Road
Firebreak Road
Range Control
Cultural Sites
Objectives
SCALE 1:30,000
Meters
500 0 500 1000 1500 2000 2500
DATUM: NAD83
(North American Datum is eqivalent to WGS84)
Prepared and Published by the Integrated Training Area Management (ITAM) Branch,
Schofield Barracks, Hawaii
Color Infrared (CIR) Imagery, February 1998
Makua Military Reservation
Grid Zone Designation.....4Q
100,000m Square ID.....EJ
Grid.....1,000m UTMz4
G-M Angle.....11 deg (200mils)

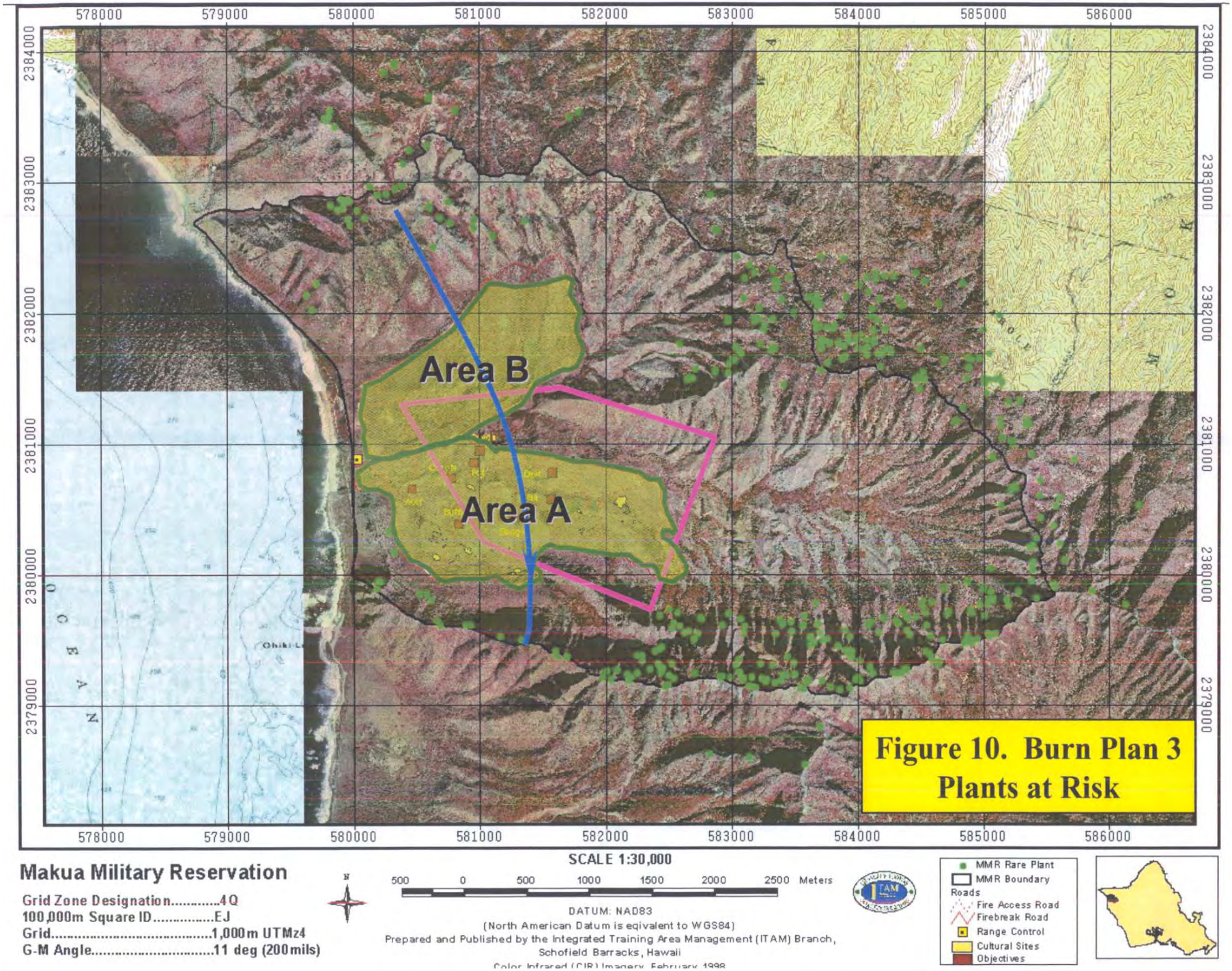


Figure 10. Burn Plan 3 Plants at Risk

not affect resources. Fire suppression activities, especially bulldozer lines and to a lesser degree, hand lines can damage cultural resources. Fire may aid in the discovery of undocumented cultural resources in that it removes vegetation that would otherwise obscure their presence.

5.9.1 Alternative 1 - Prescribed Burn Plan 1. Burning of vegetation would improve ground visibility that would provide an opportunity to survey the area and document cultural sites. The Army is consulting with the SHPO and it is anticipated that burning would not "adversely affect" any known cultural sites and any unknown sites (Appendix J).

Alternative 1 encompasses the largest burned area (485-607 hectares) and would support the requirements as outlined in paragraphs 6.c. and 8.a. of the Settlement Agreement by clearing ground vegetation to allow UXO specialists safe access to remove ordnance, if present. The determination of safe access would be done by a UXO specialist and would be dependent on how effective the burn is to allow ground visibility. The UXO specialists will identify UXO by marking them on the ground. Then the archaeologists will accompany UXO specialists to these areas to determine if detonation would affect a historic property. Those UXO that have the potential to damage historic properties will need mitigation/protection procedures in place prior to its detonation. Once the area has been cleared, detailed archaeological surveys, subsurface testing and mapping would be conducted in areas identified in the Settlement Agreement. No significant impact is anticipated on these resources.

MITIGATION: The Army will not proceed with the prescribed burn until the Section 106 consultation is completed with the SHPO and other interested parties.

5.9.2 Alternative 2 - Prescribed Burn Plan 2. This alternative encompasses 324-364 hectares and is less than Alternative 1. This prescribed burn would address part of the land area outlined in 6.c. and 8.a. of the Settlement Agreement because it supports partial clearance of the SDZ and 1,000 meter zone outside of Units A and B. Subsequently, UXO specialists would access only the burned areas and archaeological surveys would also be limited to that area. Determination of safe access would be the same as for Alternative 1. No significant impact is anticipated.

MITIGATION: The same as for Alternative 1.

5.9.3 Alternative 3 - Prescribed Burn Plan 3. This alternative encompasses the least area (283 hectares) and would address the least amount of land areas outlined in 6.c. of the Settlement Agreement. A prescribed burn in Unit A would allow surface and subsurface archaeological surveys within the CCAAC training area to be conducted. Determination of safe access would be the same as for Alternative 1. No significant impact is anticipated.

MITIGATION: The same as for Alternative 1.

5.9.4 No Action. There would be no impact as existing conditions would remain. However, the Army would not be able satisfy the requirements as outlined in paragraphs 6.c. and 8.a. of the Settlement Agreement because the vegetation would still be present to obscure ground visibility and prevent safe access for UXO specialists to clear any UXO present. Subsequently, no archaeological surveys would be conducted.

5.10 Land Use.

5.10.1 Alternative 1 - Prescribed Burn Plan 1. MMR is currently designated for military land use. The purpose of the proposed action is consistent with the land use designation and no impacts are anticipated.

5.10.2 Alternative 2 - Prescribed Burn Plan 2. The effects of this alternative would be the same as Alternative 1.

5.10.3 Alternative 3 - Prescribed Burn Plan 3. The effects of this alternative would be the same as Alternative 1.

5.10.4 No Action. No impacts are anticipated, as the existing conditions would remain.

5.11 Socioeconomic Environment.

5.11.1 Alternative 1 - Prescribed Burn Plan 1. No impacts are anticipated, as this alternative, is located further west of Waianae Town where there are no commercial businesses other than ranch land and recreation.

5.11.2 Alternative 2 - Prescribed Burn Plan 2. The effects of this alternative would be the same as for the Alternative 1.

5.11.3 Alternative 3 - Prescribed Burn Plan 3. The effects of this alternative would be the same as for Alternative 1.

5.11.4 No Action. No impacts are anticipated, as the existing conditions would remain.

5.12 Environmental Justice and Protection of Children.

5.12.1 Alternative 1 - Prescribed Burn Plan 1. The activities associated with a controlled burn would generate short-term noise and air impacts. These impacts are not expected to be disproportionately high and adversely affect human health on minority and low-income populations and children.

5.12.2 Alternative 2 - Prescribed Burn Plan 2. The effects of this alternative would be the same as Alternative 1.

5.12.3 Alternative 3 - Prescribed Burn Plan 3. The effects of this alternative would be the same as Alternative 1.

5.12.4 No Action. No impacts are anticipated, as the existing conditions would remain.

6.0 Cumulative Impacts.

Cumulative impacts were analyzed for each resource category by adding past, present, and reasonably foreseeable future actions to the Proposed Action. The Proposed Action is to conduct a prescribed burn that would help the Army accomplish the requirements of a Settlement Agreement to conduct subsurface archaeological surveys and UXO clearing within some areas of the 1,000 meter buffer zone from Farrington Highway. Those requirements are legally binding on the Army subject to certain limitations described in the Settlement Agreement.

In determining cumulative impacts of the Proposed Action, the following were taken into consideration:

a. The Army conducted annual prescribed burns within the firebreak to lessen the fuel load and reduce the risk of widespread fires in the 1990s. These burns were successfully executed except for one fire that escaped in July 1995 and no other prescribed burning has been conducted since that date.

b. The Army has conducted military training at Makua since the 1940s. However, since October 2001, the Army has conducted modified live-fire training at Makua and 13 CALFEXs have occurred to date. The Army's modified training reduces impacts to the environment by limiting the number of soldiers, types of weapons used in training, and aligning targets away from protected species and cultural resources. The past 13 CALFEXs have not resulted in any wildfires outside the firebreak, nor damage to any cultural resources.

c. The Army plans to resume annual prescribed burns in the future to control fuel loads and continue to use Makua for its modified live-fire training. NEPA documentation will be prepared.

d. MMR is in a remote location, and no other private/public development is anticipated in the area.

Anticipated cumulative impacts of the Proposed Action to the affected environment are:

a. Geology and Soils. The Proposed Action would result in loss of vegetative cover thereby increasing the potential for soil erosion. However, this impact is anticipated to be short-term and temporary because new vegetation appears within a month depending on weather conditions. Military training activities have resulted in minimal soil erosion (25th ID (L) and USARHAW 2001a). The Army uses soil erosion control measures for its modified CALFEX training and range maintenance. Accordingly, no significant cumulative impacts on geology and soils are associated with the Proposed Action.

b. Air Quality. There is a potential for unanticipated wildfires to burn in the general area at the same time as the prescribed burn. A combination of an unanticipated wildfire and the scheduled prescribed burn could result in a cumulative negative impact to air quality. However, due to the prevailing trade winds in Hawaii, remote location of MMR, and past history of prescribed burns at MMR, this situation would not likely occur and create a cumulative negative impact to air quality. No significant impacts are anticipated.

c. Noise. The incremental increase in noise would not have a cumulatively significant impact. Noise impacts from the Proposed Action would be temporary and short in duration.

d. Traffic. Traffic may be temporarily impacted from the smoke of the proposed burn but no significant cumulative impact on traffic would occur. The Army would publish notification of the burn to warn the public of possible short term hazards such as decreased visibility from smoke.

e. Hazardous and Toxic Materials. The Proposed Action would not have a significant cumulative impact related to hazardous and toxic materials since the Army would take precautions to properly use and handle hazardous and toxic materials. Spill response equipment would be on site to minimize harm. The materials proposed for use are considered “environmentally safe” or would be consumed in the fire.

f. Vegetation and Fuel Loads. The Proposed Action would not have a significant cumulative impact related to vegetation and fuel loads. It is anticipated that new vegetation would appear within one month, depending on weather conditions.

g. Threatened and Endangered Species. Under Alternative 1, the Army will need to initiate formal Section 7 consultation because the Proposed Action may adversely affect listed species and designated and proposed critical habitats. In addition, Alternative 1 would directly destroy listed species. The Proposed Action for Alternatives 2 and 3 is not likely to affect listed species or designated or proposed critical habitats. The Proposed Action would reduce the potential for a non-military wildfire to negatively impact listed species. Also, the prescribed burn would serve to protect listed species and native habitat found on the ridges by minimizing the opportunity for a wildland fire to escape during live-fire training. There would be no significant cumulative impact on biological resources.

h. Historic and Archaeological Resources. There would be no significant cumulative impact on historic and archaeological resources. Fires of low intensity generally do not damage these resources and precautions would be taken to protect resources by strictly adhering to the prescribed burn plan.

7.0 Conclusions

Based on the Army's implementation of mitigation measures described in this EA, this EA concludes that Alternatives 2 and 3 to perform a prescribed burn to remove vegetation to allow safe access into areas and reduce fuel load does not constitute a major federal action having significant effects on the quality of the human environment. Alternative 1 would have a possible significant impact on listed species and requires formal Section 7 consultation under the Endangered Species Act.

Furthermore, an Environmental Impact Statement is not required as defined by the Council of Environmental Quality (40 CFR 1500-1508) and the Department of the Army's Final Rule (32 CFR Part 651) "*Environmental Analysis of Army* Actions" and the Army intends to publish a Finding of No Significant Impact (FNSI).

Anticipated environmental consequences from the Proposed Action - Alternatives 2 and 3 would result in temporary, short-term effects. The Army will implement the following mitigation measures for Alternatives 2 and 3 (unless specifically stated):

a. Air Quality. The Army will call the City and County of Honolulu Fire Department or the Clean Air Branch prior to the prescribed burn to ensure compliance with HAR Section 11-60.1-55. The Army will also notify the Clean Air Branch if a change is made to scheduled date of the prescribed burn.

b. Traffic. Advance notice of burn dates and times will be announced through the various news medias and road signs placed along the H1 Freeway and Farrington Highway, for a week prior to and during burning operations, to inform people intending to utilize shoreline areas in the Makua area for fishing or other ocean activities.

c. Hazardous and Toxic Materials. The products will be used and stored in accordance with the manufacturer's instructions. Appropriate spill response equipment will be available at storage and transfer sites and fire extinguishing equipment/media will be kept on hand in case of accidental ignition. The Army will also conduct daily operational and safety briefings to prevent accidents and injuries to personnel involved with the prescribed activities. In addition, the Army will implement mitigation as described in "5.5 Traffic" as a precautionary safety measure for the public.

d. Vegetation and Fuel Loads/Threatened and Endangered Species.

(1) Proposed Action - Alternative 2.

(a) The Army will apply a primary and secondary fire retardant containment line for Units C1 and C2. The purpose of the secondary line ensures a second line of defense in the event of fire escape from the primary line. The fire retardant lines will be tied in or anchored to established or improved roads. Unit C1 is a smaller burn unit than the Unit C area in 1995.

(b) A representative from the fire retardant manufacturer will be on site to ensure that required concentration ratios are adequately mixed and applied properly and a refractometer will be utilized to determine proper concentration.

(c) The Army will strictly adhere to all elements outlined in the prescribed burn plan. Prior to ignition, prescription elements will be evaluated individually and collectively, against local weather forecasts and any other predicted conditions. Should any element fail to meet or exceed the limits, the prescribed burn will be suspended until all elements can be satisfied. Also, the Army will make arrangements to have personnel from the U.S. Forest Service provide oversight of the proposed prescribed burn.

(d) The Army will have one helicopter devoted to AID, and two helicopters on-site and one at Wheeler Army Airfield devoted to firefighting purposes.

(e) All Army personnel directly involved with the prescribed burn will receive firefighter and helicopter fire bucket certification. Military helicopter pilots and aircrew will attend an approved training program that includes, but is not limited to, fire behavior, tactics and bucket operations, aircraft performance considerations and planning, aircrew communications and coordination, and flight training and evaluation that focuses on water drops in mountainous terrain as well as water bucket pickup maneuvers over water reservoirs and open ocean.

(2) Proposed Action - Alternative 3.

(a) The Army will strictly adhere to all elements of the prescribed burn plan. Prior to ignition, prescription elements will be evaluated individually and collectively, against local weather forecasts and any other predicted conditions. Should any element fail to meet or exceed the limits, the prescribed burn will be suspended until all elements can be satisfied. Also, the Army will make arrangements to have personnel from the U.S. Forest Service provide oversight of the proposed prescribed burn.

(b) The Army will have one helicopter devoted to AID, and two helicopters on-site and one at Wheeler Army Airfield devoted to firefighting purposes.

(c) All Army personnel directly involved with the prescribed burn will receive firefighter and helicopter fire bucket certification. Military helicopter pilots and aircrew will attend an approved training program that includes, but is not limited to, fire behavior, tactics and bucket operations, aircraft performance considerations and planning, aircrew communications and coordination, and flight training and evaluation that focuses on water drops in mountainous terrain as well as water bucket pickup maneuvers over water reservoirs and open ocean.

e. Historical and Archaeological Resources. The Army will not proceed with the prescribed burn until the Section 106 consultation is completed with the SHPO.

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