U.S. ARMY HAWAII

Schofield Barracks Military Range Prescribed Fire

2024 Prescribed Fire Burn Plan

Specific direction and compliance to utilize prescribed fire to achieve goals and objectives stated in this burn plan come from the United States ARMY Garrison Hawaii - Integrated Wildland Fire Management Plan.

This Prescribed Fire Plan was written utilizing the most current NWCG resources listed below:

- Interagency Prescribed Fire Planning and Implementation Procedures and Reference Guide (PMS 484, 2014)
- The Prescribed Fire Complexity Rating Systems Guide (PMS 424)
- Wildland Fire Incident Management Field Guide (PMS 210)
- BEHAVE 5 fire behavior modeling program.

Wildland Fire Management
U.S. ARMY Hawaii
Justin Turnbo
Prescribed Fire Burn Boss Type 2

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Element 1: Signature Page

PRESCRIBED FIRE PLAN

ADMINISTRATIVE UNIT NAME(S): United States Army Garrison Hawaii
PRESCRIBED FIRE NAME:
Prescribed Fire Unit (Ignition Unit): Schofield Barracks Military Range

PREPARED BY:
Name (print): Justin Turnbo Qualification/Currency: RXB2

Signature: Date: 11-29-2023

TECHNICAL REVIEW BY:
Name (print): Jerimiah Thatcher – Zone Fire Management Officer (U.S. Forest Service)

Technical Reviewer Signature Jeremiah R Thatcher Qualification and Currency RXB2

COMPLEXITY RATING: MODERATE
MINIMUM BURN BOSS QUALIFICATION: RXB2

APPROVED BY:

Approved by: GREEN.CHARLES.ALLEN.1116142836 Digitally signed by GREEN.CHARLES.ALLEN.1116142836 Date: 2024.01.18 16:43:39 -10'00' Date: 18 January 2024
COL Charles Allen Green
DES Director
United States Army Garrison, Hawaii

Approved by: Digitally signed by GAINEY.NISIT.ANTHONY.1067651371 Date: 2024.01.24 12:03:00 -10'00' Date: 24 January 2024
Nisit A. Gainey
DPW Director
United States Army Garrison, Hawaii

Approved by: KILLIAN.HOWARD.JOHN.III.1086930079 Digitally signed by KILLIAN.HOWARD.JOHN.III.1086930079 Date: 2024.01.11 13:32:00 -10'00' Date: 11 JAN 2024
Howard Killian
25th ID and USARHAW TSS Program Manger
United States Army Garrison, Hawaii

Approved by: Date: 05 FEB 24
COL Steven B. McGunegle
Garrison Commander
United States Army Garrison, Hawaii

Element 2A: Agency Administrator Ignition Authorization

AGENCY ADMINISTRATOR IGNITION AUTHORIZATION

Instructions: The Agency Administrator Ignition Authorization must be completed before a prescribed fire can be implemented. If ignition of the prescribed fire is not initiated prior to expiration date determined by the agency administrator, a new authorization will be required.

Prior to signature the agency administrator should discuss the following key items with the fire management officer (FMO) or burn boss. Attach any additional instructions or discussion documentation (optional) to this document.

Key Discussion Items

A. Has anything changed since the Prescribed Fire Plan was approved or revalidated? *Such as drought or other climate indicators of increased risk, insect activity, new subdivisions/structures, smoke requirements, Complexity Analysis Rating.*
B. Have compliance requirements and pre-burn considerations been completed? *Such as preparation work, NEPA mitigation requirements, cultural, threatened and endangered species, smoke permits, state burn permits/authorizations.*
C. Can all of the elements and conditions specified in Prescribed Fire Plan be met? *Such as weather, scheduling, smoke management conditions, suitable prescription window, correct season, staffing and organization, safety considerations, etc.*
D. Are processes in place to ensure all internal and external notifications and media releases will be completed?
E. Have key agency staffs been fully briefed about the implementation of this prescribed fire?
F. Are there circumstances that could affect the successful implementation of the plan? *Such as preparedness level restrictions, resource availability, other prescribed fire or wildfire activity*
G. Have you communicated your expectations to the Burn Boss and FMO regarding if and when you are to be notified that contingency actions are being taken?
H. Have you communicated your expectations to the Burn Boss and FMO regarding decisions to declare the prescribed fire a wildfire?

Implementation Recommended by:
FMO or Prescribed Fire Burn Boss Signature:_____ Date: 12/11/23

I am authorizing ignition of this prescribed fire between the dates **14 April - 20 April 2024**

(Alternate Dates 12 May - 18 May 2024)

It is my expectation that the project will be implemented within this time frame and as discussed and documented and attached to this plan. If the conditions we discussed change during this time frame, it is my expectation you will brief me on the circumstances and an updated authorization will be negotiated if necessary.

Additional Instructions or Discussion Documentation attached (Optional): Yes ☐ No☐

Ignition Authorized by: Garrison Commander: Colonel Steven B. McGunegle

Agency Administrator Signature and Title:_____ Date_____

Element 2B: Prescribed Fire Go/No-Go Checklist

PRESCRIBED FIRE GO/NO-GO CHECKLIST

* Preliminary Questions	Circle YES or NO
A. Have conditions in or adjacent to the ignition unit changed, (for example: drought conditions or fuel loadings), which were not considered in the prescription development? If **NO** go to item C, if **YES** go to item B.	YES NO
B. Has the prescribed fire plan been reviewed, and an amendment been approved; or has it been determined that no amendment is necessary? If **YES**, go to item C. If **NO, STOP: Implementation is not allowed. An amendment is needed.**	YES NO
C. Is there a chance of fog formation post burn identified in the morning spot weather forecast? If **NO** proceed with checklist, If **YES** go to item D	YES NO
D. Have appropriate mitigation elements been identified to limit potential fog/smoke impacts to smoke sensitive targets and are they explained in the pre-burn briefing? If **YES** precede with checklist below, if **NO** STOP.	YES NO

GO/NO-GO Checklist	Circle YES or NO
* Have ALL permits and clearances been obtained?	YES NO
* Have ALL the required notifications been made?	YES NO
* Have ALL the pre-burn considerations and preparation work identified in the prescribed fire plan been completed or addressed and checked?	YES NO
* Have ALL required current and projected fire weather forecast been obtained and are they favorable?	YES NO
* Are ALL prescription parameters met?	YES NO
* Are ALL smoke management specifications met?	YES NO
* Are ALL planned operations personnel and equipment on-site, available and operational?	YES NO
* Has the availability of contingency resources applicable to today's implementation been checked and are they available?	YES NO
* Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?	YES NO
If all the questions were answered "**YES**" proceed with a test fire. Document the current conditions, location and results. If any Checklist questions were answered "**NO**", DO NOT proceed with the test fire: Implementation is not allowed.	
After evaluating the test fire, in your judgment can the prescribed fire be carried out according to the prescribed fire plan and will it meet the planned objective? **Circle: YES or NO**	

* Items required if checklist is modified *

Burn Boss Signature:_____ Date:_____

Element 3: Complexity Analysis Summary

PRESCRIBED FIRE NAME			
ELEMENT	**RISK**	**POTENTIAL CONSEQUENCE**	**TECHNICAL DIFFICULTY**
1. Potential for escape	M	M	M
2. The number and dependence of activities	M	M	L
3. Off-site Values	M	M	M
4 On-Site Values	M	M	M
5. Fire Behavior	M	M	M
6. Management organization	M	M	M
7. Public and political interest	M	M	L
8. Fire Treatment objectives	M	M	M
9 Constraints	M	M	M
10 Safety	M	M	M
11. Ignition procedures/ methods	M	M	M
12. Interagency coordination	M	M	M
13. Project logistics	L	M	M
14 Smoke management	M	M	M

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK	M
CONSEQUENCES	M
TECHNICAL DIFFICULTY	M
SUMMARY COMPLEXITY DETERMINATION	M

RATIONALE:
This project has been given a moderate rating due to the risk of spot fires, the potential Safety issues concerning UXO, and for smoke impacts to local roadways and residences.

The primary concern to firefighter safety is the UXO in the unit, however with coordination with EOD and the safety procedures outlined in **Appendix D** will help mitigate some of the risk associated with Prescribed Fire operations on the Range.

The potential for spotting or an escaped fire has been reduced by stacking heavy with aviation resources. Utilizing the heavy helicopters with the line production capabilities, as outlined in the *Adequate Holding Forces* worksheet in **Appendix G**, allow for a higher probability of success in extinguishing any spot fires or slop-overs.

Smoke impacts to motorist visibility are a concern, due to the proximity to public roadways. Refer to Elements 7, 9, 13, 17, and 19 for mitigation measures to reduce smoke impacts from burning. Wind direction, Daytime and Nighttime mixing heights and transport wind levels will be monitored closely before, during and after the burn to ensure public and firefighter safety.

Operations will normally be conducted with ARMY Fire staff in the critical overhead positions. Span of control will not exceed standard protocols, and the need for qualifications at the strike team or task force level in the regular burn organization is not anticipated.

No special logistical concerns are anticipated. The treatment areas are readily accessible by burn personnel and contingency resources. Some limited logistical and supply functions may be provided by staff from the fire management office, if necessary, but none are expected to exceed the capability of the existing support staff.

Element 4: Description of Prescribed Fire Area

A. Physical Description

1. Location**:**

   All of the Burn unit falls within the Schofield Barracks Military Reservation, Oahu, Hawaii. USGS Schofield Barracks 7.5 minute Quadrangle. The Range has roads encompassing the proposed burn area with the Fire Break Road making up 60% of the boundary and CR Bypass Range Rd and Kole Kole Rd making up the other 40%.

2. Size:

   1707 acres.

   The burn unit may be partitioned to burn smaller blocks

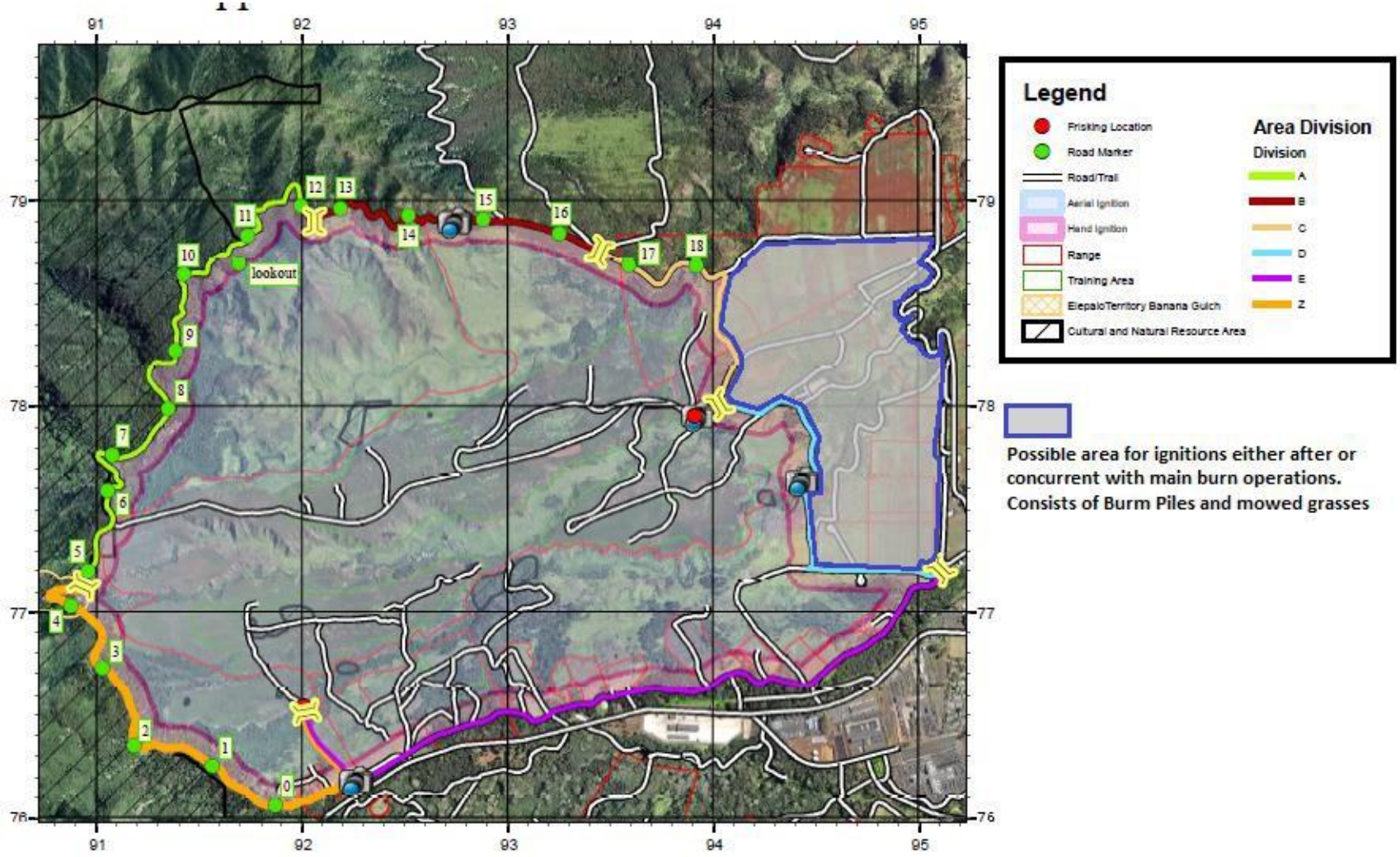
3. Topography:

   Elevation: mid- 700 meters ASL to lower 200 meters ASL.

   Slope: Zero to 40 %

   Aspect(s): South, East, North

4. Project area:



5. Ignition units:

   The map shown above (4 Project Area) displays the burn unit. The unit may be burned as a whole or divided into sub-units (ignition units). Sub-unit boundaries may include roads, trails, mowed fire line, hand line, and natural barriers.

B. Vegetation/Fuels Description:

Current vegetation:

Past environmental and land management history has dramatically altered the natural pattern, especially at the Schofield Range, where a long history of weapons testing caused frequent fires in the past. These fires enabled highly flammable pyrophytic, grasses, Panicum maximum (Guinea Grass) and Melinis minutiflora (molasses grass) to proliferate the area. Both exotic grasses are very adapted to areas with frequent fire and often take over native vegetation once established.

Vegetation to be burned is the pyrophytic grasses but mainly P. maximum. Surrounding vegetation is mostly non-native forest. Total fuel loading is approximately 6 tons/acre but can be up to 15 tons/acre in P. maximum if not burned annually.

Vegetation	Fuel Model
Desiccated Guinea Gr.	Grass 2 (Custom Model)
Recently burned Guinea or mowed ranges	99 (bare)

1. Adjacent fuels data:

   Adjacent fuels are somewhat similar to the On-Site fuels with significantly more Shrub and Forest.

Vegetation	Fuel Model
Shrub and Forest	143, 188 (Scott and Burgan 2005)
Recently burned Guinea or mowed ranges	99 (bare)

2. Percent of vegetative type and fuels model(s):

   NFDRS model is Fuel Model N. However, for BEHAVE analysis a custom guinea grass fuel model (Grass2) was developed. The vegetation in the burn area is desiccated non-native Guinea grass (Panicum maximum) approximately five feet in height. The total fuel loading is approximately six tons per acre but can be up to 15 tons per acre in Guinea grass pockets that have not burned recently.

   Prescribed burns were conducted in 2011, 2012, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023 because of the frequent burning the fuel bed depth has gotten shallower and is estimated at 2 to 3 feet. The nature of the burn unit does not allow us to enter and collect fuel samples or create vegetation plots. We have satellite imagery and ocular estimation on site. Through those methods we have been able to identify percentages of primary fuel types in the burn unit.

Inventoried Dead and Down Woody Fuel loading (tons/acre) information:

The following data was taken from the publication "Wildland Fire Risk and Management on West and South Ranges Schofield Barracks, Oahu" (Beavers 2001).

Source of Fuel Load Estimate for Fire Behavior Modeling	1 Hr Fuel Load	10 Hr Fuel Load	100 Hr Fuel Load	Live Herbaceous Fuel Load	Live Woody Fuel Load	1 hour SA/V (1/ft)	Live Herbaceous SA/V (1/ft)	Live Woody SA/V (1/ft)	Fuel Bed Depth	Moisture of Extinction
Grass 2 Custom Model	4.00	3.00	0.00	4.00	0.00	1200	1100	0.00	2.7	40
FM 8	1.50	1.00	2.50	0.00	0.00	2000	190	190	0.20	30
FM 5	1.00	0.50	0.00	0.00	2.00	2000	190	1500	2.00	20
FM 10	3.01	2.00	5.01	0.00	2.00	2000	190	1500	1.00	30

In order to take advantage of scientific changes and new fuel models utilizing Dynamic Fuel models some of the Fuel Models used by Beavers have been converted to a corresponding Scott & Burgan 40 fuel models. This decision was made based off of the publication, "Standard fire behavior fuel models: A comprehensive set for use with Rothermel's surface fire spread model" (Scott and Burgan 2005). This new set contains more fuel models in every fuel type (grass, shrub, timber, slash) than Anderson's set of 13. The number of fuel models representing relatively high dead fuel moisture content increased, and fuel models with an herbaceous component are now dynamic, meaning that loads shift between live and dead (to simulate curing of the herbaceous component) rather than remaining constant See changes below:

Source of Fuel Load Estimate for Fire Behavior Modeling	1 Hr Fuel Load	10 Hr Fuel Load	100 Hr Fuel Load	Live Herbaceous Fuel Load	Live Woody Fuel Load	1 hour SA/V (1/ft)	Live Herbaceous SA/V (1/ft)	Live Woody SA/V (1/ft)	Fuel Bed Depth	Moist-ure of Extinc-tion
Grass 2 CustomModel (Same)	4.00	3.00	0.0	4.00	0.00	1200	1100	0.00	2.7	40
FM 8 became (FM 143 or SH3)	0.45	3.00	0.0	0.00	6.20	1600	NA	1400	2.4	40
FM 5 became (FM 143 or SH3)	0.45	3.00	0.0	0.00	6.20	1600	NA	1400	2.4	40

Dynamic Model	1 Hr Fuel Load	10 Hr Fuel Load	100 Hr Fuel Load	Live Herbaceous Fuel Load	Live Woody Fuel Load	1 hour SA/V (1/ft)	Live Herbaceous SA/V (1/ft)	Live Woody SA/V (1/ft)	Fuel Bed Depth	Moisture of Extinction
FM 10 became TU3	1.10	0.15	0.25	0.65	1.10	1800	1600	1400	1.3	30

When evaluating dynamic models, be aware that live herbaceous moisture content significantly affects fire behavior because herbaceous load shifts between live and dead, and dead fuel usually has much lower moisture content than live. The dynamic fuel model process is described by Burgan (1979); the method is outlined below:

• If live herbaceous moisture content is 120 percent or higher, the herbaceous fuels are green, and all herbaceous load stays in the live category at the given moisture content.

• If live herbaceous moisture content is 30 percent or lower, the herbaceous fuels are considered fully cured, and all herbaceous load is transferred to dead herbaceous.

• If live herbaceous moisture content is between 30 and 120 percent, then part of the herb load is transferred to dead. For example, if live herb moisture content is 75 percent (halfway between 30 and 120 percent), then half of the herbaceous load is transferred to dead herbaceous, the remainder stays in the live herbaceous class.

C. Description of Unique Features, Natural Resources, Values:

The Maximum Manageable Area (MMA) boundary follows the firebreak road at 93 feet on the uphill side of the road. On the slopes and ridges above the burn area, several endangered species, both plant and animal, are known to reside. These include the Hawaiian pomace flies (Drosophila aglaia and Drosophila obatai), the endangered Oahu elepaio (Chasiempis ibidis) and its critical habitat (Unit 1 Northern Waianae Mountains), the endangered Hawaiian hoary bat (Lasiurus cinereus semotus), and the following endangered plants: *Alectryon macrococcus var. macrococcus, Asplenium dielfalcatum, Delissea subcordata, Flueggea neowawraea, Labordia cyrtandrae, Neraudia angulata var. angulata, Phyllostegia mollis, Platydesma cornuta var. decurrens, Pteralyxia macrocarpa, Schiedea hookeri, and Schiedea kaalae*. If a fire breaches this MMA boundary, it will be considered an escaped fire. The habitat inside the boundary will be protected by judicious ignition at the edge of the tree canopy.If the ignition is properly done, the fire will extinguish itself when it enters the shady, moist environment under the tree canopy. **See Appendix A: Critical Habitat Map**

Elepaio critical habitat occurs along the west side of much of the burn unit. Extra care will be taken in the gully between South Firebreak Road marker 5 and 6 because it is occupied by a pair of endangered Oahu Elepaio birds. This area will be ignited early in the burn, when fire will not carry into the shaded forest cover.

In the spring of 2008 endangered Drosophila (fruit fly) habitat was identified above the North firebreak between markers 13 and 14. The area directly above the north firebreak between markers 13 and 14 shall be sufficiently wet prior to ignition in the area. A water tender or Brush truck will directly apply water to the area. An additional brush truck with 400 gallons shall support the ignition operation during the lighting phase. Two type 1 helicopters will be available with less than a 15 minute response time.

The properties mainly include remnants of traditional Native Hawaiian occupation of the area. Historic properties have been identified through many archaeological investigations, ethnographic studies, and a multitude of Section 106 and cultural monitoring consultations. Historic properties within the fire APE collectively represent all of the eligibility criteria for listing on the National Register of Historic Places, although most have been determined as eligible for listing through criterion D.

Within the MMA and within and around the edges of the BAX/MPRC target infrastructure there are numerous historic properties that could be affected by fire control measures. Much of the BAX/MPRC will receive preliminary fire protection measures. Prior to the burn, historic properties will be identified near these elements for avoidance of ground disturbing or water-dropping actions might be necessary to determine if they should also be prepared rather than allowing them to burn, which is deemed beneficial for reducing invasive vegetation disturbance and facilitating research. There are several sites within and around the perimeter of the BAX/MPRC that are currently marked with Seibert stakes for training avoidance and will facilitate on-the-ground fire-fighting identification. Some sites are buried and unmarked however should not be a problem unless ground disturbing methods are employed. Given that the area is known for UXO, it is assumed ground-disturbing methods will be extremely limited.

Outside the MMA there are numerous historic properties that could be affected by fire control measures. Within 50m on either side of the Firebreak, several sensitive historic properties should be avoided near road markers 0, 1, 3, 6, 7, 9, and 17. The historic property locations will be reviewed prior to the burn for awareness and discussion for fire control actions near them. Much of the area above the Fire Break has not been surveyed for cultural resources and avoidance areas cannot be identified in advance.

D. **Maps - Attach in Appendix A**

1. Vicinity (Required)
2. Project/Ignition Unit(s) (Required)
3. Significant or Sensitive Features (Optional): ☐Included ☒Not Included
4. Fuels or Fuel Model(s)(Optional): ☒Included ☐ Not Included
5. Smoke Impact Area (Optional): ☒Included ☐ Not Included

Element 5: Objectives

A. Management objectives:

- Burn will provide future protection to listed species because it will reduce fuels in the vicinity of the firebreak roads and burn combustible fuels around the Elepaio habitat inside the firebreak road.

- Protection of archeological and cultural sites including wildland urban interface protection and structure protection.

- Remove vegetation by 80% or greater of ground cover to enhance visibility of UXO in areas specified. This will be measured 1 week post fire utilizing ocular estimation and photo point data

- Reduce fuel loading by 80% or greater. This will be measured 1 week post fire utilizing ocular estimation and photo point data. This will help to reduce future flame lengths and create and maintain fuel breaks to enable easier suppression of future wildfires.

B. Prescribed fire objectives:

- Ensure that public and firefighter safety is not jeopardized or threatened during prescribed fire operations.

- Manage smoke emissions through best available mitigation measures. Measurable success will be both the lack of complaints and the lack of observed smoke impacting sites to be avoided.

- Attempt to meet the needs and requests as outlined in the Management objectives above.

Element 6: Funding

A. Cost:

Total estimated cost: $66,000.00 (burn only)

B. Funding source:

Wildland Fire Management funds

Military staff and the ARMY fire staff will determine annual funding needs associated with implementing the prescribed fire. Once approved and funded, account numbers will be established and be made available to Military Staff and assigned burn personnel for the implementation of these prescribed fires.

Element 7: Prescription

A. Prescription Narrative:

1. This burn plan includes a wide variety of fuel and environmental conditions. The following prescription was written to allow a wide range of weather conditions to meet the objectives of the prescribed fire. It is the responsibility of the Burn Boss to evaluate all forecasted weather conditions, both individually, and as a whole, in determining whether or not conditions will be favorable for meeting burn objectives. It is also the responsibility of the Burn Boss to determine if burn resources will be adequate based on the weather forecast and expected fire behavior.

   The prescription parameters in the Burn Plan, including fire weather and fire suppression holding forces, were developed using the National Fire Behavior Fuel Model N, of the National Fire Danger Rating System (NFDRS) and a guinea grass custom fuel model jointly developed by the Army and the Service. The Burn Plan includes measures to minimize spot fire occurrence and to ensure that any spot fire is contained within 93 feet (28 meters) upslope of the firebreak roads.

   The prescribed burn will not occur if the 10-minute average wind speed at SBWR is greater than 15 mph or when one-hour fuel moisture is below eight percent. In addition, grass outside the firebreak roads will be green (live herbaceous fuel moisture outside the burn unit will be 80 percent or higher, as calculated at the Schofield Barracks weather station (RAWS 499902)). Live herbaceous fuel moisture can be over 250 percent when grass is green and falls below 30 percent when grass is cured. At higher live fuel moisture levels, water within the grass vegetation serves as a heat sink, which slows fire spread.

2. One objective of this burn is that the fuels are 80% or more consumed by fire in order to allow enhanced ground visibility for UXO and archeological teams. A safe method to achieve a clean burn is to desiccate the targeted fuels and burn them when surrounding fuels are green. Desiccation will be accomplished with herbicides, as per an approved Aerial Herbicide Plan, if necessary.

   In the past, U.S. Fish and Wildlife Service and Army Wildland fire have burned using herbicide treatment to kill/brown the grass areas which are the focus of the burn. Greener adjacent fuels lessen the chance of an escaped prescribed fire. This Burn Plan is good for 14 April - 20 April 2024 (Alternate Dates 12 May - 18 May 2024.

B. Prescription Parameters:

A. Environmental Prescription:

Environmental Prescription		
ENVIRONMENTAL PARAMETER	**HOT**	**COOL**
Mid-flame Wind Speed (mph) 0.4 reduction of 20ft	MFW=6 20ft=15	MFW=2 20ft=6
Day-time RH (%)*	45	80
Temperature (F)	95	30
Wind Direction**	**(SE,E, NE)**	
1 hour Fuel Moisture (%)	≥ 8	≥ 12
10 hour Fuel Moisture (%)	≥ 10	≥ 14
100 hour Fuel Moisture (%)	≥ 12	≥ 15
Live Herbaceous (%)	≥ 80	≥ 150
Live Woody (%)	≥ 100	≥ 100
KBDI	≤ 600	> 100
Mixing Height:	≥ 1700 ft	
Transport Wind:	≥ 7 mph	

Narrative:

If the prescription limits are exceeded, the Prescribed Fire Burn Boss must evaluate fire controllability and if the fire will meet objectives. If objectives are not being met the Prescribed Fire Burn Boss must take action to maintain control of or secure the fire. [1]

B. Fire Behavior Prescription:

Fire Behavior Prescription[1]		
*FIRE BEHAVIOR PARAMETER****	**HOT**	**COOL**
GR 3 Custom Grass Model		
Max Rate of Spread (headfire):	30.5 ch/h	9.4 ch/h
Max Flame Length (headfire):	12.7 ft	8.3 ft
Max Rate of Spread (flanking):	2.5 ch/h	2.9 ch/h
Max Flame Length (flanking):	4.1 ft	4.6 ft
TU3 (Moderate Load, Humid Climate Timber-Grass-Shrub)		
Max Rate of Spread (headfire):	27.3 ch/h	7.9 ch/h
Max Flame Length (headfire):	7.0 ft	3.7 ft
Max Rate of Spread (flanking):	2.3 ch/h	2.5 ch/h
Max Flame Length (flanking):	2.1 ft	2.2 ft
FM 143 / Shrub 3		
Max Rate of Spread (headfire):	4.2 ch/h	2.1 ch/h
Max Flame Length (headfire):	2.3 ft	1.7 ft
Max Rate of Spread (flanking):	0.4 ch/h	0.6 ch/h
Max Flame Length (flanking):	2.1 ft	1.0 ft

***For RH values** 40% - 44%, Burn Boss must request FMO approval before conducting prescribed fire operations.

****Wind:** The Burn Boss will determine optimum wind direction depending on the size of the treatment area, proximity to smoke sensitive roads and forecasted dispersion index.

***Although in prescription, **combinations** of weather parameters such as high temp., low RH, high wind and fuel moistures will be carefully considered before making a "go" decision. Other factors such as days since rain, and local fire danger conditions will be accounted for in the decision process.

[1] See appendices for prescription calculations and Fire Modeling.

Element 8: Scheduling

A. Implementation Schedule:

1. Ignition Time Frames/Season(s):
   This burn will be completed using this prescription between: 14 April - 20 April 2024
   (Alternate Dates 12 May - 18 May 2024.

B. Projected Duration:

The burn will require 2 to 3 days for completion of ignition, with complete burn out of heavy fuels and smoldering lasting up to a week. The burn may be implemented so that all ignition operations are completed during the burn period and heavy fuels have had a chance to substantially burn out prior to the end of the burn period to minimize overnight smoldering and smoke production.

C. Constraints:

Utilizing local ARMY resources, including local cooperators and Military staff will help to reduce cost and provide the manpower to successfully complete the burn units.

Heavy visitation and use during the Holidays may reduce the opportunity to burn. The Burn Boss should be sensitive to the local area and commuters adjacent to the burn area.

Element 9: Pre-burn Considerations and Weather

A. Considerations:

1. On-site:

To be completed by burn boss or designee at least one day prior to burn:

- Assess unit perimeter for snags that may pose holding concerns or firefighter / public safety issues, prep or fall as required.
- Break up and scatter jack pots and windrows adjacent to fire lines that pose a threat to holding forces
- Verify designated containment lines are adequate for forecast conditions.
- Verify site prep of all included Military infrastructure has been completed.
- Inspect contingency lines and infrastructure adjacent to the burn unit for holding concerns in the event of an escaped fire.
- Designate and mark drop points as required.
- Contact and verify contingency resources.

Burn Boss or designee will ensure the following are completed on the day of the burn:

- In coordination with Range Control unlock all gates in the fire area to provide for ingress and egress.
- Post area and/or road closure signs as required. Where feasible, consider leaving portions of roads open and assign road guards.
- Outreach with public and community to explain the benefits of prescribed fire.
- Traffic Warning Signs - The Burn Boss or designee will ensure that traffic and smoke warning signs are placed on roadways prior to ignition to alert motorists of the prescribed fire in progress and the potential for smoke along the roadway. The Burn Boss or designee will determine the exact sign locations based upon the local road conditions and the expected smoke dispersion on the day of the burn.
- Preposition supplies (drip torch fuel, full bladder bags, etc.) as required.
- Install hose lays if needed.
- Verify that hydrants are functional and pre-position hydrant wrenches if needed.

2. Off-site:

To be completed by designated Military or ARMY Fire staff at least one week prior to burn:

- Dip sites will be filled, at a minimum, to 75 percent of total capacity (the 7-foot mark) prior to ignition.
- Contact the ARMY aviation resources and request the helicopter support required.
- Monitor weather station data and begin dialog with NWS regarding forecast accuracy for the area.
- Acquire a burn permit from the State Department of Health, Clean Air Branch. (This may take more than a week to get. Typically, a month or more is required)
- Notify Military staff of pending burn.
- Place fliers at popular areas describing prescribed fire and benefits to the eco-system.
- Issue news release to the media.

To be completed day of burn by Burn Boss or designee:

- Obtain spot weather forecast from NWS HNL **(808) 973-5286**
  Or, via the internet at:
- http://www.prh.noaa.gov/hnl/
- Complete Notification List Items (section C below).
- Ensure a Delegation of Authority has been prepared and signed by the Agency Administrator or acting. (Signature on this plan constitutes a delegation of authority to the Burn Boss if from another Agency)
- Prepare maps and Incident Action Plan (IAP). Required elements include the following:
  - A) Organizational Assignment (ICS-203)
  - B) Medical Plan (ICS-206)
  - C) Safety Message (or ICS-215A)
  - D) Division Assignment List (ICS-204)
  - E) Communication Plan (ICS205)
  - F) Project Map
  - G) Weather Forecast

B. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):

- The Burn Boss or designee will obtain a spot weather forecast from the National Weather Service prior to ignition, and on all subsequent days until the Burn Boss determines that there are no threats to unit boundaries.

- The Burn Boss or designee in charge of mop-up and patrol will also obtain and review the spot weather forecast to determine if mop up and patrol resources are adequate.

- During the burn on-site weather, fire, and smoke observations will be documented by a Fire Effects Monitor (FEMO) or other Firefighter that can take weather observations. The Burn Boss will determine the frequency for collecting observations based on the on-site conditions. The current weather observations will be broadcasted to burn personnel at intervals determined by Burn Boss or designee. On-site weather observations will be used when requesting spot weather forecasts.

- Monitor fire weather and smoke forecasts prior to the burn using the following websites:

    1. Fire Wx Forecast http://www.srh.noaa.gov/mob/moved.php

    2. Verify smoke dispersal forecast using the HYSPLIT online smoke screening tool: http://ready.arl.noaa.gov/HYSPLIT.php

    3. Request spot weather forecast from NWS Honolulu **(808)-973-5286** for each operational period: http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=mob

C. Notifications:

A designated Military Public Information staff member will notify affected Military neighbors, Military staff, and adjacent landowners as early in the planning and implementation process as practical. Information will be made available to the public describing prescribed fire projects and resource benefits associated with prescribed fire. The following burn notification list will be completed day of burn by the burn boss or designee:

A. Submit plan and Record of Environmental Consideration (REC)			
Name	**Organization**	**Phone**	**Email**
Ed Hewitt	NEPA Coordinator	656-5811	ed.j.hewitt.civ.@army.mil
B. Notify by email			
Name	**Organization**	**Phone**	**Email**
Ron Rico	Honolulu Fire		rrico@honolulu.gov
Gregg Moriguchi	Federal Fire Dept	471-3880 cell 306-6756	gregg.moriguchi@navy.mil
Neil Fujioka	Federal Fire Dept.	590-1544	neil.fujioka@navy.mil
Robert Hauff	State Protection	587-4174	robert.d.hauff@hawaii.gov
Ryan Peralta	DOFAW	292-5645 cell	ryan.k.peralta@hawaii.gov
Rick Black	US Army PAO	656-3154	rick.e.black.civ@army.mil
James Kwon	U.S. Fish & Wildlife		james_kwon@fws.gov
Dawn Bruns	U.S. Fish & Wildlife	927-4602	Dawn_Bruns@fws.gov
Jackie Alvarez-Martinez	DPW Environmental	656-3107	jacqueline.s.alvarez-martinez.civ@army.mil
Michelle Ogman	DPW Environmental	656-3316	michelle.r.ogman.civ@army.mil
Prisiclla Ramirez	DPW Environmental	656-3104	priscilla.ramirez18.ctr@army.mil
Kyle Sasahara	DPW Environmental	656-1703	kyle.c.sasahara.civ@army.mil
Kapua Kawelo	DPW, Natural Resource Manager	656-9189	hilary.k.kawelo.civ@army.mil
Rhonda Suzuki	DPW Deputy Director	656-1289	rhonda.l.suzuki.civ@army.mil
Jessica Adinolfi	USAG-HI Oahu Biologist		
Laura Gilda	US Army Arch	655-9731	laura.l.gilda.civ@army.mil
Howard Killian	Army Range Control	655-1404	howard.j.killian2.civ@army.mil
Randal Au	Range Control	655-1490	randall.k.au.civ@army.mil
Ken Torre	Range Control	655-9509	kenneth.p.torre.civ@army.mil
State Forestry		808-587-4173	
Dept. of Health, Clean Air Branch		808-586-4200	
Regional Dispatch	FED FIRE	808-474-2222	

Element 10: Briefing

A pre-burn briefing will be conducted with all assigned resources prior to initiating the test burn and at the start of each subsequent operational period. This briefing may be conducted on-site if desired. The standard prescribed fire briefing format shall be followed. The following briefing checklist may be utilized to facilitate the briefing:

A. Briefing Checklist; including, but not limited to: (additional items may be added)

- ☐ Burn organization and assignments
- ☐ Prescribed Fire objectives and prescription
- ☐ Description of prescribed fire project area
- ☐ Special considerations and sensitive features
- ☐ Expected weather and fire behavior
- ☐ Communications
- ☐ Ignition plan
- ☐ Holding plan
- ☐ Contingency plan and assignments
- ☐ Wildfire declaration
- ☐ Safety and medical plan
- ☐ Aerial ignition briefing (if aerial ignition devices will be used)

Additional items to discuss:

1. Air/ground radios with who? FIRB, HOLDING, RXB2

- Each team will have an ICOM

2. Safety

- Are there any elements in the Complexity Analysis that were rated high that could not be mitigated? If so, discuss these.

- Explosives

- Pigs

3. Helicopter plan: CHANGES WITH FUEL/STANDBY

- They can fly at sunrise

- Special: Pilot wet which areas for his bucket check

- Assume 5-10 minutes for helicopters to respond

- ONE HOUR'S FUEL?

- ARE WIND SOCKS AVAILABLE?

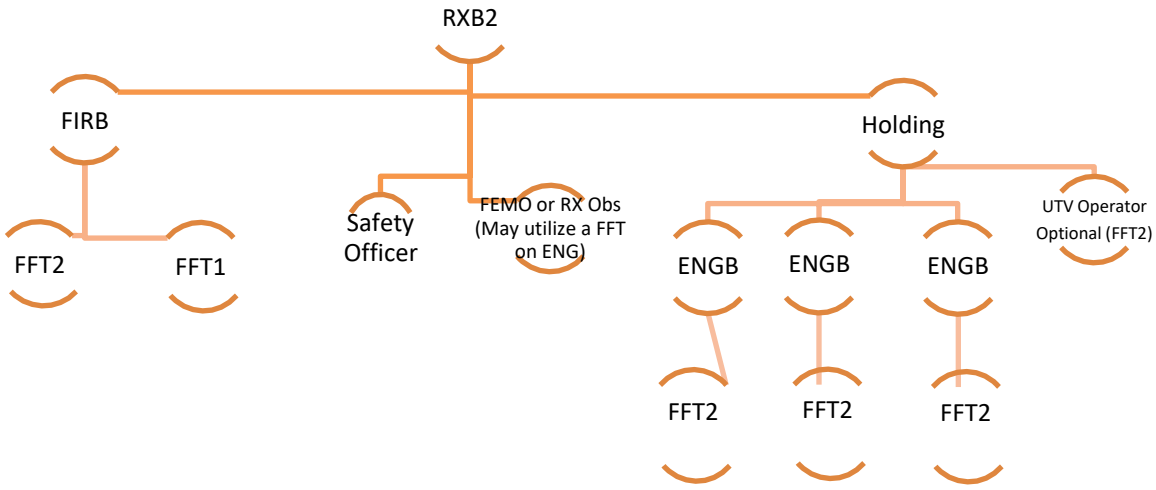
- CRASH KITS/EXTINGUISHERS

- HELICOPTER MANAGER

Element 11: Organization and Equipment

A. Positions:

The organization chart represents the ***minimum*** personnel and equipment determined to be adequate for the anticipated conditions (See Appendix for Holding Resources Worksheet)**.** The burn boss is ultimately responsible for evaluating each specific burn unit on burn day and determining the required number, type, and kind of resources required to safely implement the burn. Thus, additional resources may be added or resource configurations/assignments altered for each operational period so long as the above minimums are met. Specific daily organization and assignments will be documented in the Incident Action plan for each operational period. Minimum Qualifications of the holding specialist should be Single Resource Boss qualified but may need to be increased to TFLD if additional resources are assigned. Span of control shall be maintained at all times (i.e. limit number of assigned resources per supervisor to five or fewer).



B. Equipment:

Three Type 6 Engines are required on-site during the burn. One Type 6 Engine may be staged on-site and remain unstaffed during the burn. It is required on-site in the event that the primary Type 6 becomes inoperable or in the event that all engines are needed for holding operations. If used, it must be staffed by a qualified ENOP or ENGB and one FFT2.

EQUIPMENT	IGNITION PHASE	MOP-UP PHASE	PATROL PHASE
T6 engines (150-400 gal)	**3**	**2**	**1**
T4 engines (750+ gallons, 50 gpm)			
T3 engines (500+ gallons, 150 gpm)			
Tenders/tankers	**1**	**1**	
T1 Helicopter	**4**		
	(2 onsite; 2 on 2hr standby)		
T1 or T3 Helicopter for Aerial Ignition and or Bucket support	**1 onsite ONLY if aerialignition is used**		
UTV's or ATV's to assist with holding and fire.	As needed	As needed	As needed

ATVs and UTVs are allowed during the burn provided that they are assigned to a fully qualified operator.

Helicopter Support Requirements

1. 2 type 1 helicopters are for immediate bucket support. All helicopters will be used for bucket support if a spot fire occurs outside the firebreak road. UH60's and CH47's are both Type 1 Aircraft and depending on mission needs they may be used interchangeably.

2. All helicopters will have a minimum of one hour of fuel on board and will have on-site or utilize (WAAF) fuel if available. A minimum of one hour of fuel should be always kept on board all helicopters during the prescribed burn operations so that in the event of a spot fire, one full hour of continuous bucket work can be produced by each of the helicopters.

C. Supplies:

Drip Torch	Min 6 and 15 gal of Fuel
Firing Device	100 Rounds for Device

All standard prescribed fire and wildland fire supplies may be used during burn operations, including but not limited to hand tools, drip torches, drip torch mix, and bladder bags.

Aviation Assets

CH – 47 Chinook & UH – 60 Blackhawk

- 2 x aircraft (Stand-by)
- Capable of heavy fire suppression
- 1 hr activation time
- Request approval authority: 25 ID G3

- Water source: Dragon X-ray dip pond
- 10 x buckets per hr. (20K gals)

UH – 60 Blackhawk

- 2 x aircraft
- Capable of medium fire suppression
- 660 gal bambi bucket (4 x OH)

- Request approval authority: 25 ID G3G
- Water source: Dragon X-ray
- 12 x buckets per hr (7.9K gals)

Aviation Requirement Summary:

1. Provide two (2) flight crews, two (2) UH60s, and two (2) 660 Gallon water buckets and report to the Schofield Barracks Dragon X-ray LZ daily from 0700-1900 during the prescribed burn window. Flight crews will conduct aerial saturation of designated sectors for fire containment.

2. Provide one (1) flight crew, one (1) UH60, and one (1) 660 Gallon water bucket to be placed on standby with a two-hour response time to report to the Schofield Barracks Dragon X-ray LZ from 0700-1900 during the prescribed burn window. The flight crew will be utilized if prescribed burn cannot be contained with on-scene assets.

3. Provide one (1) flight crew, one (1) CH47 and one (1) 2K Gallon water bucket to be placed on standby with a two-hour response time to report to the Schofield Barracks Dragon X-ray LZ daily from 0700-1900 during the prescribed burn window. The flight crew will be utilized if prescribed burn cannot be contained with on-scene assets.

Ground Assets

Ford F350 Brush Truck

- 4 x trucks (2 person crew)
- All-terrain capable with 400 gal water tank (high pressure pump)
- 650 feet of 1-1/2 in hose
- 3 x portable Mark-3 pumps

Ford Super Duty F750XL Water Tanker

- 1 x truck (2 person crew)
- All-terrain capable with 2.2K gal water tank (high pressure pump)
- Sidewinder vertical spray - remote control
- 650 feet of 1-1/2 in hose

Ford F250 GSA Pick-up Truck

- 2 x trucks (1 - 2 person crew)
- 1 x truck outfitted with Compressed Air Foam System (CAFS)

4x4 Utility All Terrain Vehicles (ATV)

- 4 x on hand

Element 12: Communication

A. Radio Frequencies:

More specific communications for prescribed fire implementation can be outlined in the Incident Action plan and reviewed during briefing.

FIRE EMERGENCY SERVICE DIVISION			
POSITION	CALL SIGN	Internal Net	External NET
IC 201	IC 6	A 1	C 1
Brush 205	205	A 1	
Brush 206	206	A 1	
Brush 207	207	A 1	
Brush 208	208	A 1	
Tanker 209	209	A 1	
CAF 226	226	A 1	
ATV	Ignition Boss	A 1	
Transportation 202	202	A 1	
Transportation 203	203	A 1	

EOD SUPPORT			
POSITION	CALL SIGN	Internal Net	External NET
EOD TEAM 1	EOD 1	A 1	
EOD TEAM 2	EOD 2	A 1	

AVIATION			
POSITION	CALL SIGN	Internal Net	External NET
UH-60	Tail Number	122.925	
UH-60	Tail Number	122.925	
CH-47	Tail Number	122.925	
K and S helicopters Bell 407	Tail Number	122.925	
	Alternate Freq	38.3	

INCIDENT COMMAND			
POSITION	CALL SIGN	Internal Net	External NET
Burn Boss	Burn Boss	A 1	C 1
FESD	IC 6	A 1	C 1
MOBILE IC 1	IC1	A 1	C 1
MOBILE IC 2	IC 2	A 1	C 1
MOBILE IC 3	IC 3	A 1	C 1
OPs	OPS	A 1	C 1
PAO LNO	PAO	A 1	C 1
MEDICAL LNO	MEDICAL	A 1	C 1
SAFETY OFFICER	SAFETY	A 1	C 1
EOD PL	EOD 6	A 1	C 1
EOD PLT SGT	EOD 7	A 1	C 1

RANGE CONTROL			
POSITION	CALL SIGN	Internal Net	External NET
Range Control	Range Control		A 5

EOC			
POSITION	CALL SIGN	Internal Net	External NET
EOC	EOC		C 1

IOC			
POSITION	CALL SIGN	Internal Net	External NET
IOC	IOC		C 1

CMD GRP / DIRECTORATE OF EMERGENCY SERVICES			
POSITION	CALL SIGN	Internal Net	External NET
DES Director	DES 6		C 1
DES XO	DES 6A		C 1

OPS / DIRECTORATE OF EMERGENCY SERVICES			
POSITION	CALL SIGN	Internal Net	External NET
Emergency Ops Center (DES)	DES OPS		C 1

FED FIRE			
POSITION	CALL SIGN	Internal Net	External NET
Fed Fire	Fed Fire	STNBY	

HONOLULU FIRE DEPARTMENT			
POSITION	CALL SIGN	Internal Net	External NET
HFD		STNBY	

PACE PLAN	
PRIMARY	RADIO
ALTERNATE	CELL PHONE
CONTINGENT	DATA
EMERGENCY	RUNNER

>NET A 1 PLMR

>NET C 1 PLMR

>NET 5 A PLMR

>NET 122.925 ICOM

B. Telephone Numbers:

The following contact information is provided for key contacts, additional contact information and numbers may be found above in Appendix K.

TITLE	NAME	PHONE
DES Director	COL Charles Allen Green	808-787-1694
DES Deputy	Jim Tyler	808-656-6454
Provost NCOIC	MSG Brown	808-656-0525
Operations Officer	James Williams	808-656-6454
WFPM and Burn Boss	Justin Turnbo	808-798-6579
ARMY Fire Crew Supervisor	Jake Faber	808-223-5076

Element 13: Public and Personnel Safety, Medical

A. Safety Hazards:

Please refer to the safety materials and the prescribed fire Job Hazard Analysis in Appendix D for specific safety hazards and the appropriate mitigation measures.

B. Mitigation: Measures Taken to Reduce the Hazards:

All burn personnel will wear standard wildland firefighting personal protective equipment.

The Burn Boss or designee will ensure that smoke warning signs are placed on local roadways prior to ignition. The exact location of the signs will be determined by the Burn Boss on the day of the burn. The Burn Boss is responsible for ensuring that smoke emissions and roadway visibility are monitored throughout the burn. Additional smoke warning signs may be placed on local roads at the discretion of the Burn Boss. See Elements 7, 9, 13, 17 and 19 for more information regarding smoke management and mitigation measures.

The Burn Boss or designee will conduct a daily safety and project briefing prior to work for each operational shift of the project. The Burn Boss or designee will complete an IAP prior to each operational period that will address objectives, fire weather/behavior, assignments, communications, and safety hazards, and a medical plan. All personnel involved in the project must attend the briefing or receive a briefing from the Burn Boss prior to assisting with burn operations. The prescribed fire Job Hazard Analysis included in Appendix D will be available on-site at all burns.

It is the responsibility of all burn personnel to inform their supervisor of any safety hazards observed during the prescribed fire. The Burn Boss will work with the appropriate supervisors to institute any corrective safety measures associated with this project. If a safety issue cannot be resolved prior to ignition of any portion of this project, ignition will not take place. If the issue occurs during the course of operations, it will be mitigated with the most reasonable measures possible that will provide for safety of public and employees. If necessary, the project will be shut down until the mitigation efforts are successful.

C. Emergency Medical Procedures:

- Please refer to Appendix H for the sample Medical Plan. An updated copy of the Medical Plan will be included in the Incident Action Plan for all operational shifts.
- Notify the burn boss and fireline supervisor immediately of any injuries to firefighters or the public.
- NEVER broadcast the name(s) of injured personnel over the radio.
- Secure individual from further injury. Closest EMT or First Responder will render aid to the injured personnel if required.
- The first responding resource to the IWI will be designated as the Incident within the Incident Commander (IWI- IC) until properly relieved to oversee operations and logistics for care and transport of the injured individual(s).
- The Burn Boss will notify Range Control for every injury requiring medical attention.

- Contingency resources may be required to replace injured personnel and those who are providing care of injured personnel.

D. Emergency Evacuation Methods:

If an injury is of a serious nature an Ambulance will be dispatched to the area by the IWI-IC or Range Control. In some cases, the injured personnel may have to be transported to an area accessible to an ambulance. Movement of injured personnel should be coordinated with medical personnel to avoid further injury. All Aero medical transport will be coordinated with Range Control. Fire personnel may be required to assist in getting patients to a Landing Zone.

D. Emergency Facilities:

Emergency facilities and contact information will be identified in the Medical Plan, which will be included in the Incident Action Plan for all operational shifts.

EMERGENCY FACILITIES:

Name	Address or Coordinates	Lat and Long	Travel Time **Air**	**Ground**	Helipad Yes	No	Burn Center Yes	No
Straub Clinic & Hospital Burn Unit	888 S. King St. Honolulu, HI 96813 (808) 522-4000 **The Burn Center at Straub: 1-808-522-3731**		15	30			X	
Queens Medical Center	1301 Punchbowl St. Honolulu 96813 (808) 538-9011	Lat: 21.309169, Lng: -157.852980			X			X
Kahuku Hospital	56117 Pualalea Street Kahuku, HI 96731 (808) 293-9221	Lat: 21.676263, Lng: -157.953914			X			X

Element 14: Test Fire

A. Planned Location:

A test fire will be conducted on each burn unit as part of the go/no-go burn decision process. The test fire will be ignited in an area with fuels that are representative of fuels being targeted within the prescribed fire unit and that is easily controlled. The purpose of the test fire is to verify that observed fire behavior will meet management objectives for the burn and to verify predicted smoke dispersion. Results of the test fire will be documented by the burn boss and firing boss and retained as part of the Prescribed Fire Record (Fire Report).

B. Test Fire Documentation:

1. Weather conditions on site

   These will be taken by the FEMO or Weather Observer and included in post fire report.

2. Test fire results:

   Should be documented utilizing the form below.

Test Fire Results		
	Yes	**No**
Are all prescription parameters favorable for implementing the burn?		
Narrative Comments:		
Is the observed fire behavior within prescription?		
Narrative Comments:		
Is the test fire successful, will it meet the plan objectives?		
Narrative Comments:		
If three items above are all "Yes", proceed with the prescribed fire.		

Signatures	
Burn Boss / Date / Time Holding Boss / Date / Time	Firing Boss / Date / Time

Element 15: Ignition Plan

A. Firing Methods:

The prescribed fire may be implemented by aerial and/or ground ignition.

B. Techniques, sequences, and patterns:

After the test burn, engines will stage around the perimeter road as per direction from the Holding Boss. The pattern of ignition at each site will be determined by the burn boss; however, black lining along the firebreak roads will always be done by hand from the ground.

Ignition will begin by building a blackline along containment lines. Interior ignition may begin once the blackline has been established. Ignition may produce head, backing, or flanking fire as long as burn objectives are being met and the fire behavior is within prescription parameters. The FEMO or Weather Observer will document fire behavior and inform the Firing Boss of the observed fire behavior. The Firing Boss is responsible for adjusting firing tactics as needed to meet burn objectives.

If objectives are not being met, the Burn Boss shall terminate ignition operations until conditions become more favorable. If the project area comes back into prescription based on current and forecasted weather, ignition operations may continue; if not, the unit shall be placed in a mop-up and patrol status. Holding actions shall maintain control of the fire until a decision is made to continue, postpone, or suppress the fire. The Burn Boss will document this decision process.

C. Devices:

Any common ignition devices may be employed during the implementation of this plan. Ignition devices that may be employed are drip torches, very pistols, ATV torches, fusees, plastic spheres and / or Quick-Fire flares. Firing operations may employ any combination of these tools to achieve management objectives. Established safety practices for the use of these ignition devices will be observed at all times, refer to the attached JHAs.

D. Minimum Ignition Staffing:

The minimum staffing chart lists 1 Firing Boss and 2 igniters. Additional personnel may be utilized so long as span of control can maintain a safe operation.

Element 16: Holding Plan

As directed by the Interagency Prescribed Fire Planning and Implementation Procedures Guide, holding operations will be managed by a "Holding Specialist" qualified at the appropriate Incident Command System wildland fire operations standard. For smaller burn organizations involving holding resources of a single type, a single resource-qualified individual may be utilized. For larger burn operations involving varied types of resources, an Incident Commander Type 4 or Task Force Leader is required. It is the responsibility of the Burn Boss to evaluate each burn unit to determine the resources required, as well as the appropriate qualifications necessary to safely implement the burn.

A. General Procedures for Holding:

Holding resources may include engines, water tenders, hand crews or squads, and specialized equipment such as UTVs and ATVs with water tanks. Holding resources will work to ensure that the prescribed burn is contained within the targeted area and to protect infrastructure, private property, cultural sites, research equipment, and other values at risk. Known values at risk and water sources will be identified on the project map and discussed during the pre-burn briefing. Several units contain interior roads, trails, fireline, mowed lines and creeks that may be used as holding lines if it becomes necessary to terminate the burn.

Mop-up of all or part of the unit will occur if the Burn Boss or Fire Management Officer determines there is potential risk of escape or if needed to reduce smoke emissions. Personnel will remain on the fire until the burn boss determines it safe to leave, after which regular patrols will be instituted until the burn is declared out.

The Holding Specialist will supervise and direct suppression efforts for any spot fires or slop-overs that occur. If the complexity of the suppression operation exceeds the qualifications of the Holding Specialist, an Incident Commander at the appropriate qualification level will be assigned to lead suppression efforts.

B. Critical Holding Points and Actions:

The Burn Boss and Holding Specialist will evaluate critical holding areas and the required mitigation strategies prior to ignition. Critical holding areas and mitigation will be discussed at the pre-burn operational briefing.

C. Minimum Organization or Capabilities Needed:

Refer to Holding Resources Worksheet (Appendix G).

Element 17: Contingency Plan

This contingency plan identifies the Management Action Points that indicate when additional actions are needed, the actions to be taken, the resources necessary to implement the actions, the resources responsible, and the consequences of inaction.

A. Management Action Points or Limits:

Designator and Description: Prescribed fire objectives (element 5)
Condition: Burn objectives are not being met due to undesired fire behavior.
Management Intent: Alter firing tactics or patterns to improve burning conditions.
Recommended Action to Consider:

A. If fire behavior is not sufficient to meet burn objectives, alter firing tactics or patterns toincrease fire intensities.
B. If fire behavior is too intense for meeting burn objectives, alter firing patterns to decreasefire intensities.
C. If adjusting firing tactics and patterns is unsuccessful due to current weather conditions, but conditions are expected to improve later in the operational shift, postpone the burn until conditions improve.
D. If adjusting firing tactics and patterns is unsuccessful due to current weather conditions and weather conditions are not expected to improve, terminate the burn.

Recommended Resources:

A. FEMO, FIRB, Ignition personnel
B. FEMO, FIRB, Ignition personnel
C. Burn Boss
D. Burn Boss

Time Frame:

A. Immediately
B. Immediately
C. Immediately
D. Immediately

Describe the consequences of not taking the recommended actions:

A. The burn will be completed, but fire behavior will be insufficient for meeting burn objectives.
B. The burn will be completed, but fire behavior will be too intense and could result in undesirable resource damage.
C. If ignition continues before weather conditions improve, burn objectives will not be met as described in A and B.
D. If ignition continues and the burn is completed under unfavorable conditions, burn objectives will not be met as described in A and B.

Responsibility:

A. The FEMO is responsible for notifying the FIRB of the need to alter tactics to meet objectives. The FIRB is responsible for adjusting tactics and patterns to improve burning conditions.
B. The FEMO is responsible for notifying the FIRB of the need to alter tactics to meet objectives. The FIRB is responsible for adjusting tactics and patterns to improve burning conditions.
C. Burn Boss
D. Burn Boss

Date Each Action is initiated:

A. _____
B. _____
C. _____
D. _____

Designator and Description: Smoke impacts
Condition: Smoke on local roadways results in potentially unsafe driving conditions.
Management Intent: Reduce smoke impacts to roadways by altering firing tactics, postponing ignition, terminating the burn, and/or implementing traffic control.
Recommended Action to Consider:

A. If fire intensity is inadequate for creating vertical lift of the smoke column, adjust firing tactics and patterns to produce higher intensity fire with the intent of influencing the smoke to lift.
B. If smoke impacts are due to unfavorable winds and weather conditions are expected to improve later in the operational period, postpone ignition until wind conditions become favorable.
C. If smoke impacts are expected to be of short duration and traffic control can mitigate safety concerns without compromising the safety of traffic control personnel or motorists, implement traffic control to slow motorists or stop traffic until conditions improve.
D. If smoke impacts cannot be mitigated or conditions are not expected to improve, terminate the burn and implement traffic control to slow motorists or stop traffic until conditions improve.

Recommended Resources:

A. Burn Boss, Firing Boss, ignition personnel
B. Burn Boss, Firing Boss, ignition personnel
C. Burn Boss, Law Enforcement
D. Burn Boss, Law Enforcement

Time Frame:

A. Immediately
B. Immediately
C. Immediately
D. Immediately

Describe the consequences of not taking the recommended actions:

A. Continued smoke impacts could result in vehicle accidents and injuries to the public and burn personnel.
B. Continued smoke impacts could result in vehicle accidents and injuries to the public and burn personnel.
C. Continued smoke impacts could result in vehicle accidents and injuries to the public and burn personnel.
D. Continued smoke impacts could result in vehicle accidents and injuries to the public and burn personnel.

Responsibility:

A. The Burn Boss is responsible for determining if smoke impacts warrant the need to alter ignition tactics. The Firing Boss is responsible for altering firing tactics and patterns to favorably influence fire behavior.
B. The Burn Boss is responsible for making the decision to postpone ignition, and to make the decision to resume ignition once conditions improve.
C. The Burn Boss is responsible for requesting traffic control through Military Police or Law Enforcement. Military Police or Law Enforcement will be responsible for making the determination of whether to implement traffic control or request a road closure.
D. The Burn Boss is responsible for making the decision to terminate the burn, and for requesting traffic control through Military Police or Law Enforcement.

Date Each Action is initiated:

A. _____
B. _____
C. _____
D. _____

Designator and Description: Prescription parameters exceeded.
Condition: On-site weather or fire conditions fall outside of allowable limits during the burn.
Management Intent: Select the safest course of action to either finish the burn, postpone ignition until conditions improve, or terminate the burn.
Recommended Action to Consider:

A. If the burn can be safely held using interior fire lines or natural barriers and conditions are expected to return to allowable limits, ignition will be postponed until conditions improve.
B. If the burn can be safely held using interior fire lines or natural barriers but conditions are not expected to return to allowable limits as outlined in the prescription, then the burn will be terminated.
C. If the burn can be safely held using interior fire lines or natural barriers, but completing the burn will result in undesirable fire effects ignitions should be adjusted or the burn terminated.
D. If the burn cannot be safely held using interior fire lines or natural barriers and the burn can be extinguished without compromising firefighter safety, then the burn will be terminated, and the appropriate suppression tactic will be used.
E. If the burn cannot be safely held using interior fire lines or natural barriers and completing the unit will result in undesirable fire effects, but the burn cannot be safely extinguished without compromising firefighter safety, then ignition may proceed until the unit is completed.

Recommended Resources:

A. Burn Boss, FEMO, Firing Boss, ignition personnel
B. Burn Boss, FEMO, Firing Boss, Holding Specialist
C. Burn Boss, FEMO, Firing Boss, ignition personnel
D. Burn Boss, FEMO, Holding Specialist, holding personnel
E. Burn Boss, FEMO, Firing Boss, ignition personnel

Time Frame:

A. The burn will be secured and postponed until conditions return to allowable limits.
B. Immediately
C. The burn will continue until it is completed.
D. Immediately
E. The burn will continue until it is completed.

Describe the consequences of not taking the recommended actions:

A. Burn objectives may not be met, and the potential for long-term resource damage exists.
B. Burn objectives may not be met, and the potential for long-term resource damage exists.
C. Burn objectives may not be met, and the potential for long-term resource damage exists.
D. Burn objectives may not be met, and the potential for long-term resource damage exists.
E. Burn objectives may not be met, and attempting to suppress the fire could result in firefighter injury.

Responsibility:

A. The FEMO is responsible for notifying the Burn Boss once the burn is out of prescription. The Burn Boss is responsible for determining is the burn can be safely held until conditions improve. The Firing Boss and ignition personnel will secure the fire along interior fire lines or natural barriers as needed.
B. The Burn Boss is responsible for determining if conditions may improve later in the operational shift, and for making the decision to terminate the burn.
C. The Burn Boss is responsible for determining whether the burn can be safely held, and for making the decision to terminate or to continue the burn.
D. The Burn Boss will make the decision to terminate the Burn. The Holding Specialist will direct personnel to suppress the fire using the appropriate response.
E. The Burn Boss will make the decision to terminate or to continue the burn.

Date Each Action is initiated:

A._____ B._____C._____D._____E. _____

Designator and Description: Spot fires (includes slop-overs)

Condition: Spot fires occur

Management Intent: Contain spot fires as quickly as safety allows to reduce the risk of an escape fire.

Recommended Action to Consider:

A. If a spot fire occurs and it is safe to do so, the person discovering the fire will immediately extinguish the spot fire. After the spot fire is extinguished, the Holding Specialist will be notified via the radio.

B. If a spot fire occurs that cannot be extinguished by the person who discovers it, they will notify the Holding Specialist of the spot fire via the radio. The discovering person will provide a brief size up of the fire and identify the resources needed to suppress the fire. The Holding Specialist will shift burn resources to the location of the spot fire and direct suppression efforts until the spot fire is contained.

C. If a spot fire occurs that exceeds the capabilities of on-site burn resources, the Holding Specialist will notify the Burn Boss of the need for additional resources. The Burn Boss will order the contingency resources identified in the IAP. Suppression efforts will continue until the spot fire is contained.

D. If a spot fire occurs that cannot be contained by burn personnel and contingency resources within the next operational period, if additional resources not identified in the contingency plan are required, or if there is an immediate threat to life and property that cannot be mitigated by burn personnel and contingency resources, the Burn Boss will declare the burn to be a wildfire. See Element 18 for more information on converting the prescribed burn to a wildfire.

Recommended Resources:

A. Holding Specialist, burn personnel
B. Holding Specialist, burn personnel
C. Holding Specialist, Burn Boss
D. Holding Specialist, Burn Boss

Time Frame:

A. Immediately
B. The size up and request for resources will be made immediately upon discovery of the spot fire.
C. Immediately
D. Wildfire declaration will occur as soon as it is clear that on-site resources will not be sufficient for containing the spot fire within the next operational shift.

Describe the consequences of not taking the recommended actions:

A. Spot fires may damage resources and threaten life and private property.
B. Spot fires may damage resources and threaten life and private property.
C. Spot fires may damage resources and threaten life and private property.
D. Spot fires may damage resources and threaten life and private property.

Responsibility:

A. The person discovering the spot fire.

F. The person discovering the spot fire is responsible for sizing up the fire and determining the resources necessary to suppress the spot fire. The Holding Specialist is responsible for shifting burn resources to suppress the spot fire and directing suppression efforts.

G. The Holding Specialist is responsible for requesting additional resources to aid suppression efforts. The Burn Boss is responsible for activating contingency resources.

H. The Burn Boss is responsible for making the final determination whether or not the spot fire can be contained by on-site resources within the next operational period. The Burn Boss is responsible for declaring a wildfire.

Date Each Action is initiated:

A._____ B._____ C._____ D._____ E. _____

Element 18: Wildfire Declaration

A. Wildfire Declared By:

If the Burn Boss determines that contingency actions, identified in Element 17, will not be successful in containing the fire by the end of the next operational period, or if there is an immediate threat to life and property that cannot be mitigated by burn personnel and contingency resources, the Burn Boss will convert the prescribed fire to wildfire status (escaped fire).

B. IC Assignment:

An Incident Commander at the appropriate IQCS level will be assigned based on incident complexity.

C. Notifications:

The Burn Boss will notify the Fire Management Officer and or ARMY Fire Chief. The Burn Boss, Fire Management Officer or ARMY Fire Chief will then notify the following:

( ) Time:_____	Burn Boss notifies IOC	656-3269/3272, IOC Chief 3278
( ) Time:_____	Range Control	Radio frequency 38.30
( ) Time:_____	DES Director (Deputy)	656-6454 (o); 226-1776 (c)
( ) Time:_____	Federal Fire Department	471-3303
( ) Time:_____	Honolulu Fire Department	423-4411
( ) Time:_____	U.S. Fish and Wildlife	792-9469
( ) Time:_____	Division of Forestry	587-4173
( ) Time:_____	US Army PAO	656-3154

D. Extended Attack Actions and Opportunities to Aid in Fire Suppression (Optional):

Possible contingency equipment to be ordered if an escape is declared (this equipment will be confirmed on the day of burn). The Incident Commander may request contingency resources through Fed Fire representatives on site.

EQUIPMENT	NUMBER	SOURCE	ARRIVAL DELAY
T6 engines (150-400 gal)	**1**	Federal Fire	15 minutes
T4 engines (750+ gallons, 50 gpm)			
T3 engines (500+ gallons, 150 gpm)			
Tender/tanker	**1**	Federal Fire	15 minutes
Air tankers			
T1 helicopter (16 seat, 5000 lbs)	**2**	US Army	120 minutes

Note: Resources listed as "contingency" in the IAP must be available to respond to the incident within the specified timeframe. If the contingency resource becomes unavailable to respond to the prescribed fire, it must be replaced immediately, as the burn is now out of prescription.

ESCAPED FIRE SITUATION ANALYSIS (EFSA)

Fire Management Area: Schofield Range, Oahu

Location: The Schofield Range is in central Oahu near Kolekole Pass.

Fire Name: Schofield Barracks 2024 Prescribed Fire

Fire Grid Coordinates/Lat Long: Lat/long will be provided if fire escapes (location of escape)

Date: Target Primary 14 April - 20 April 2024 (Alternate Dates 12 May - 18 May 2024), actual prescribed fire willtake 6 days.

Land Status: The area is either leased or owned by the U.S. Army

Adjacent Landowners: U.S. Navy to West, private to south, private to north, U.S Army to east.

Fire Management Option(s): Full Protection Management Option. All fires in these designated areas will receive aggressive suppression effort until the fire is declared out. This option is designed for the protection of high natural resource value areas, and cultural and historical sites found within or adjacent to the fire management area.

This information is used as a pre-attack Escaped Fire Situation Analysis (EFSA) to provide guidelines to the Prescribed Burn Manager for the development of a joint EFSA with the Federal Fire Department (FFD), DOFAW, and City and County of Honolulu Fire Department under the Unified Command Situations of the Incident Command System (ICS).

EVALUATION CRITERIA (Check those criteria which MUST be met):

a. Economic:	Government Facilities	☒
	Military Targetry Equipment	☐
	Road and Trail Network	☒
b. Environmental:	Watershed Influences	☐
	Threatened and Endangered Species	☒
	Wildlife Habitat	☒
	Soil Protection	☐
	Natural Forest Reserves	☒
c. Social:	Air Quality	☐
	Shoreline Aesthetics	☒
	Hunting, Fishing Habitat	☐
	General Outdoor Recreation	☐
	Firefighter and Public Safety	☒
	Public Concerns	☒
d. Other:	Archeological and Cultural Resources	☒
	Neighboring Lands	☒

ALTERNATIVES

Alternative	A	B	C	D
General Plan of Control (Strategic)	Full fire control of all fires within burn unit(s)	Contain within Schofield firebreak roads	Contain within Schofield installation boundary	Contain to Waianae Range
Specific Plan	Direct attack of perimeter	Direct/Indirect attack along SBMR firebreak roads	Direct/Indirect attack from fuel breaks and along perimeter Modified Suppression Actions	Direct/Indirect attack from fuel breaks and along perimeter Modified Suppression Actions
Probability of Success	97%	90%	75%	50%
Size (Predicted)	1100 acres	<1200 acres	<1200 acres	>5000 acres
Estimated Control Time	< 2 hours	< 8 hours	>12 hours	> 24 hours

RESOURCES REQUIRED

Alternative	Firefighting and Logistical Resources	Estimated Cost
A	DES, Range Division, Aviation Support, Fed Fire	$15-20K
B	DES, Range Division, Aviation Support, Fed Fire	$20-30K
C	DES, Range Division, Aviation Support, Fed Fire, G3, Honolulu Fire Dept, Division of Forestry & Wildlife	>$30K
D	All Wildland Fire Cooperative Resources	>$50K

SELECTED ALTERNATIVE

A. Selected Alternative: A then B then C and then D.

B. Justification: (Document the rationale, criteria, value change, available resources, etc., for selection of this alternative).
   a. Full suppression of wildfire is the order.
   b. Direct attack, going indirect when necessary to contain fire at the smallest size possible, in the shortest period.
   c. Human values at risk from modified suppression actions.
   d. Unified Command with MSE, FFD, HFD, DOFAW for management of the fire incident.
   e. Pre-attack guidelines are in the Wildland Fire Management Plan, dated March 2003.
   f. Potential threat and damage to Threatened and Endangered Species habitat areas.
   g. Native forest will convert to alien-dominated savanna and grassland types.

C. Public Information Direction: (Keeping public informed of situation)
   a. Refer to Army Public Affairs Office (PAO).
   b. IC will designate Information Officer.
   c. Cooperation with Oahu Civil Defense Center for complex situations.

Element 19: Smoke Management and Air Quality

A. Compliance:

Particulate matter and chemical components of smoke can be hazardous to the public. Maximum allowable concentrations are set by the Environmental Protection Agency and are known as National Ambient Air Quality Standards (NAAQS).

Smoke emissions from this prescribed burn will not result in non-attainment of NAAQS on the public highway, beaches, camping areas, or towns in the area. However, if any area in the state has already reached non-attainment or there is a threat of non-attainment from point sources other than the prescribed burn, the State will declare a no-burn day.

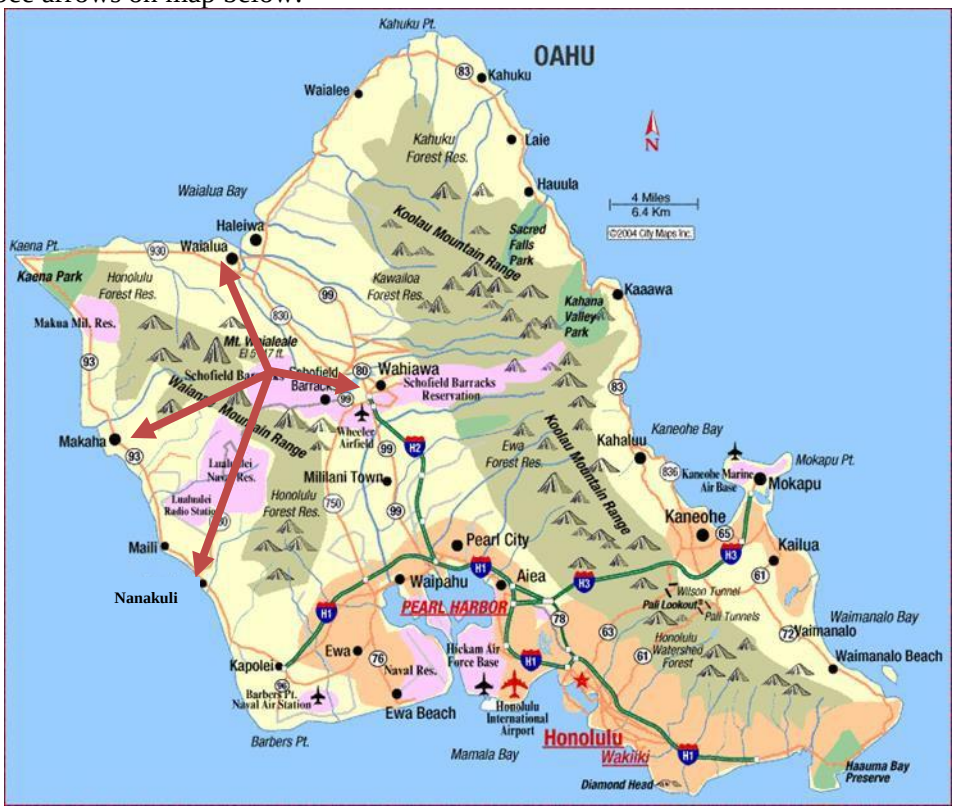
B. Permits:

Written approval from the DOH Clean Air Branch is required to conduct a prescribed burn.
The burn boss or designated person will call the State of Hawaii Department of Health, Clean Air Branch to ensure that is a permissive burn day for the selected area (as provided in Hawaii Administrative Rules, Section 11-60, 1-55).

Be prepared to provide the following:
Time of burn (planned)
County and location (latitude and longitude if possible)

C. Smoke Sensitive Areas/Receptors:

A few air sheds can be impacted by heavy smoke from Schofield Range. One is over Kolekole Pass and into Nanakuli or Makaha, North over Mt Waialeale into Waialua, and another is down drainage into Wahiawa. See arrows on map below:



D. Potential Impacted Areas:
It is anticipated that the most likely smoke impacts will be within 5 to 10 miles down wind of the project area as identified in the map above. To see full range of potential impact areas refer to **Appendix A: Smoke Impact Map.**

E. Mitigation Strategies and Techniques to Reduce Smoke Impacts:
The prescription parameters established for this plan should minimize most smoke impacts. Burning during daytime hours will allow for most combustion to occur during the burning period when smoke can be diluted and dispersed on transport winds.

The following mitigation measures may reduce smoke impacts:

- Verify smoke dispersal forecast using the HYSPLIT online smoke screening tool: http://ready.arl.noaa.gov/HYSPLIT.php will be utilized the day of the burn and the day after the burn to verify anticipated smoke trajectory.
- The Burn Boss shall evaluate smoke impacts to roads, and if impacts are likely, establish mop-up standards as appropriate to reduce smoldering.
- Ignition will cease at least one hour before sunset.
- Daily burned acreages will be limited based on anticipated and observed smoke production.
- The FMO or designee will contact employees and local residents about pending prescribed fire operations.
- The burn boss may designate resources to post Prescribed Fire and Smoke Ahead signs along roads and other possible locations as identified based on forecast weather conditions.
- The Burn Boss may assign personnel to either late shift or early morning shift to monitor any road issues.
- If required, the Burn Boss through DES may task Military Police, law enforcement, or burn personnel with traffic duties to slow down road traffic, implement one-way traffic, or escort pilot car through smoke impacted areas.

Element 20: Monitoring

Monitoring associated with prescribed fire operations ensures prescription elements are valid for meeting stated objectives, documents pre- and post-fire conditions, ensures progress toward desired future conditions is being made, and short- and long-term objectives are being realized. Monitoring on this project may occur pre-burn, during operations, and post-burn.

A. Monitoring Procedures:

1. Pre monitoring will be done by taking photographs in 360 degrees from the 4 designated Photopoints. A monitoring pole will be used to assist in ocular estimation of fuel bed height and depth. These will have to be taken at or on roads and fire breaks due to UXO in the burn unit.
2. Post monitoring will consist of taking photographs in 360 degrees from the 4 designated Photopoints. Photographs will be taken 1 week post burn, 6 months post burn. A monitoring pole will be used to assist in ocular estimation of fuel bed height and depth. These will have to be taken at or on roads and fire breaks due to UXO in the burn unit.

B. Weather Monitoring (Forecasted and Observed) Required and Procedures:
During the burn, the FEMO or weather observer will be responsible for documenting the on-site weather, smoke, and fire behavior observations. The weather observer or Ranger Control will broadcast current weather observations and RAWS indices and conditions to burn personnel at intervals determined by Burn Boss or designee.

C. Fire Behavior Monitoring Required and Procedures:
Photographs and video may be recorded to document fire behavior. .

D. Monitoring Required to Ensure that Prescribed Fire Plan Objectives are Met:
Long-term evaluation of the burn may be conducted by ARMY fire crew to document fire related changes over time and to ensure burn objectives are being met.

E. Smoke Dispersal Monitoring Required and Procedures:
During the burn, the FEMO or weather observer will be responsible for documenting the on-site weather, smoke, and fire behavior observations.

Element 21: Post-burn Activities

A. Post-Burn Activities that must be completed:

The burn boss or designee will maintain a project file that includes:

A. Original signed prescribed fire burn plan
B. Agency Administrator Go/No-go Pre-Ignition Approval
C. Operational Go/No-Go Checklist
D. IAPs
E. Monitoring data including weather, fire behavior and fire effects observations
F. Weather forecasts
G. Notification list
H. Job Hazard Analysis with signatures
I. Post-burn fire report

Prescribed Fire Plan Appendices

Appendix A: Maps: Vicinity, Project or Ignition Units (or both), Optional: Significant or Sensitive Features, Fuels or Fuel Model, Smoke Impact Areas

Appendix B: Technical Reviewer Checklist

Appendix C: Complexity Analysis

Appendix D: Agency-Specific Job Hazard Analysis or Risk Assessment

Appendix E: Fire Behavior Modeling Documentation or Empirical Documentation

Appendix F: Smoke Management

Appendix G: Adequate Holding Forces Worksheet

Appendix H: Medical Plan

Appendix I: Test Fire Documentation

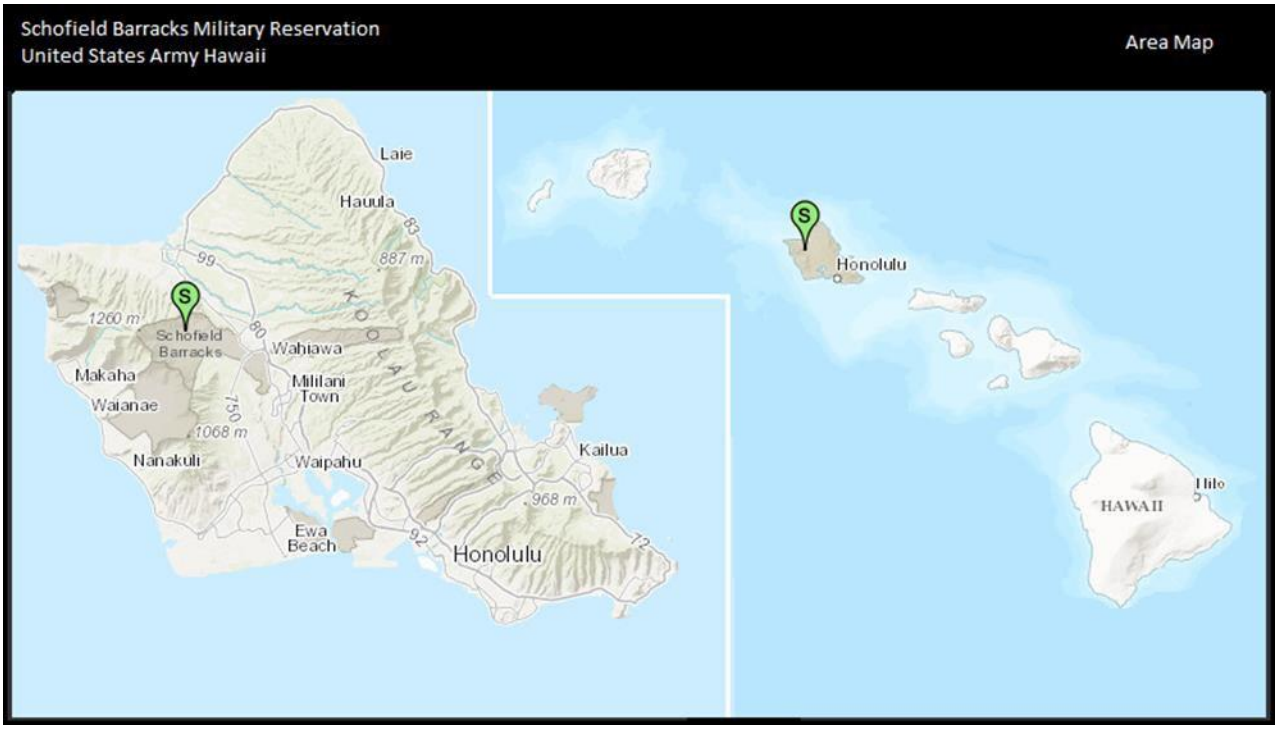
Appendix J: Required Notification List

Appendix K: Contact List

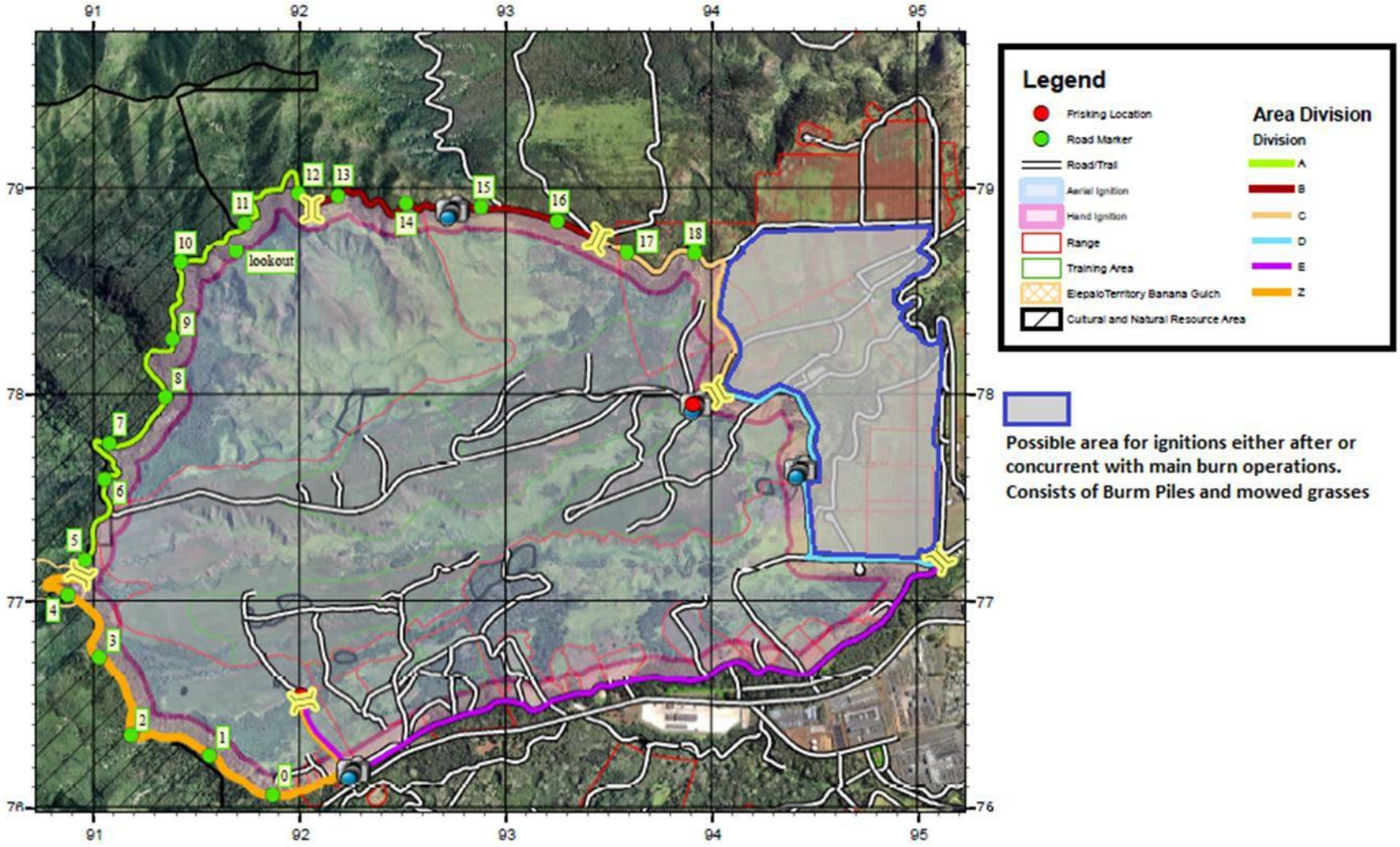
Appendix L: Works Cited

Appendix A: Maps

Vicinity Map



Project Map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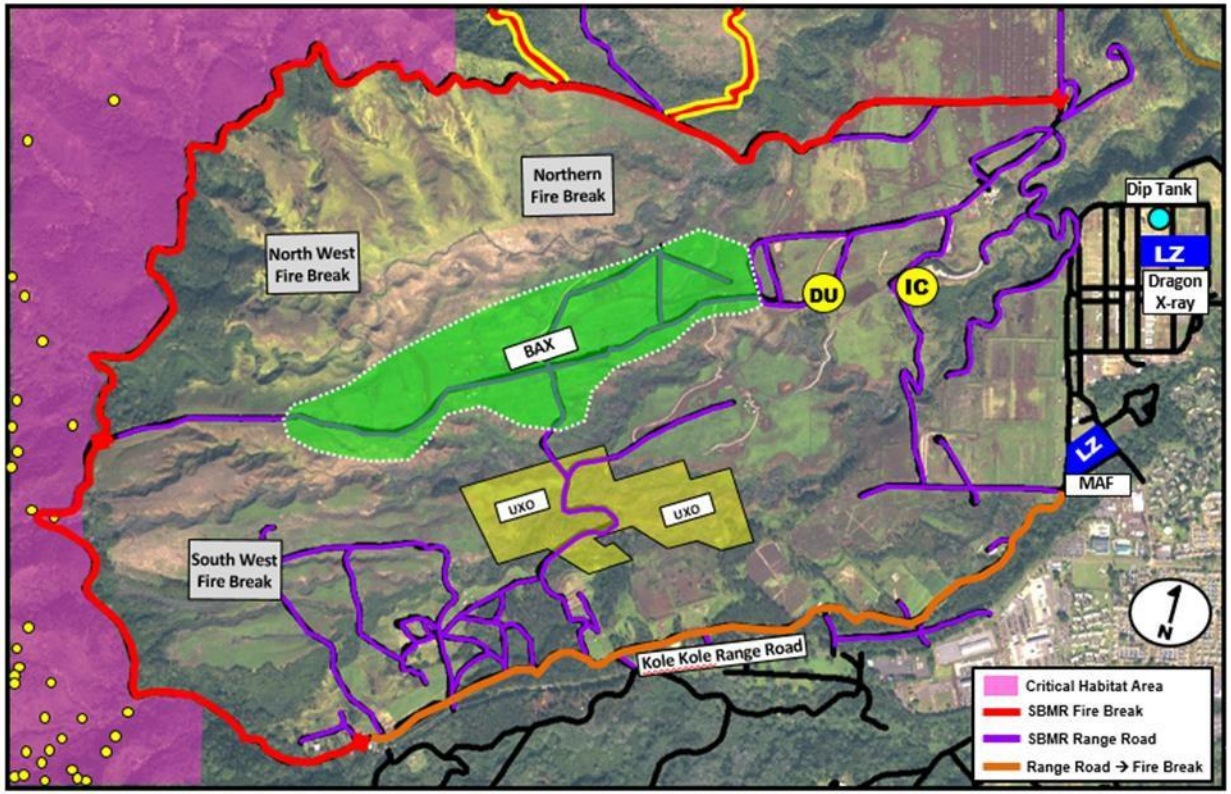
14
15
16
17
18
Legend
Frisking Location
Road Marker
Road/Trail
Aerial Ignition
Hand Ignition
Range
Training Area
ElepaloTerritory Banana Gulch
Cultural and Natural Resource Area
Area Division
Division
A
B
C
D
E
Z
Possible area for ignitions either after or concurrent with main burn operations. Consists of Burm Piles and mowed grasses

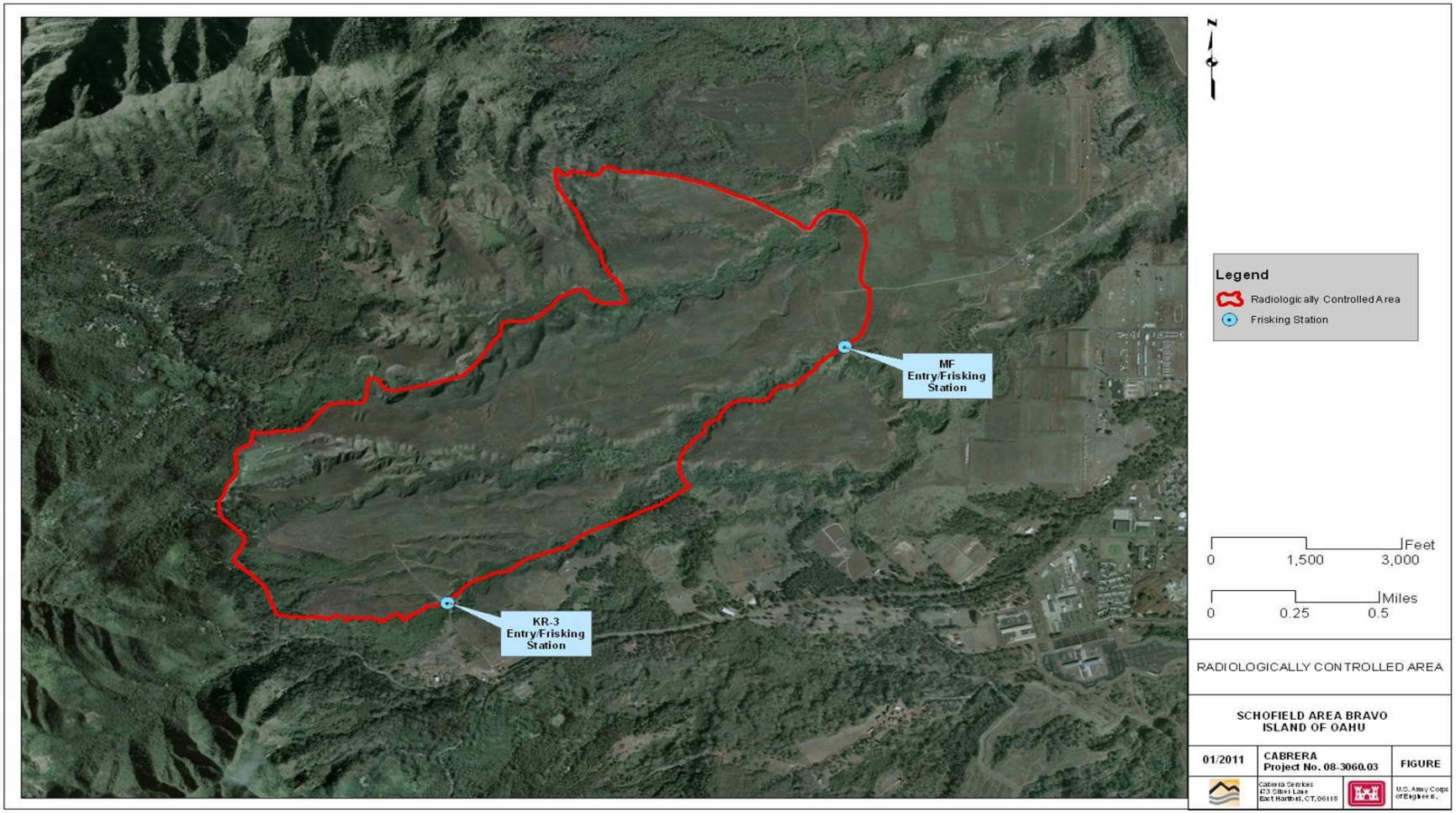
Natural and Environmental Sites

Schofield Barracks Military Range
Prescribed Fire Plan

Natural / Environmental Sites



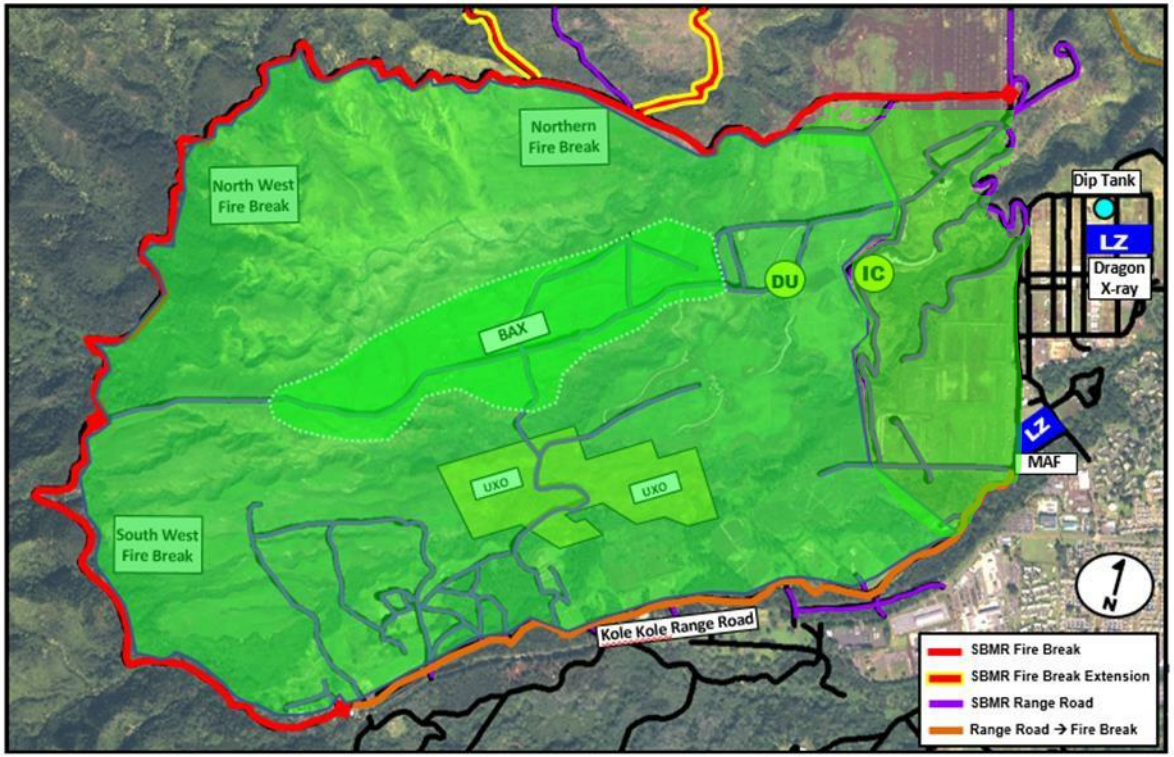
Radiological Controlled Area



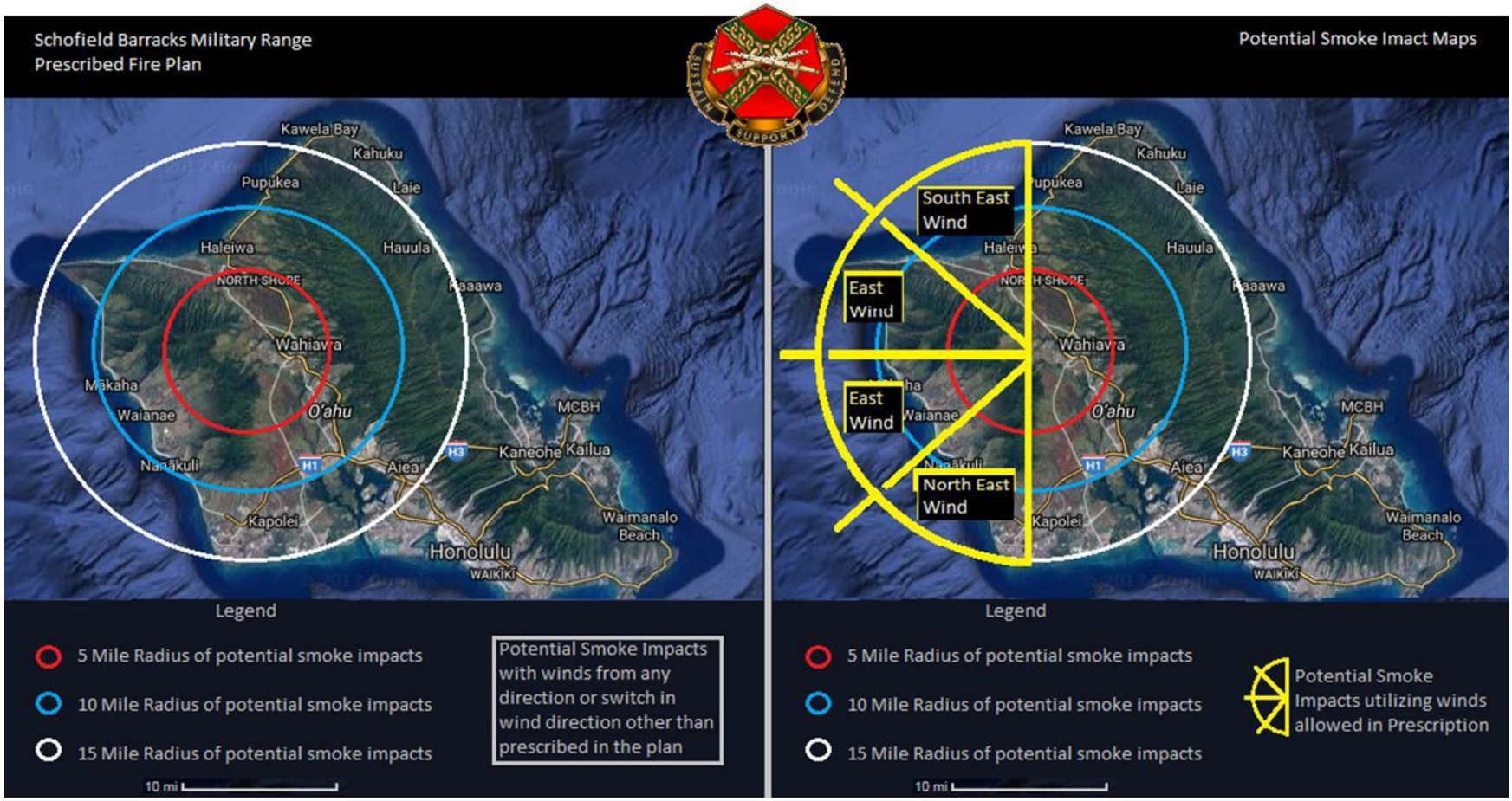
Burn Area Map

Schofield Barracks Military Range
Prescribed Fire Plan

Approved Burn Area



Smoke Impact Areas Maps



Appendix B: Technical Reviewer Checklist

Rate each element in the following table with an "S" for Satisfactory or "U" for Unsatisfactory. Use Comment field as needed to support the element rating.

Fill out this checklist based on the guidance provided in the Technical Review section in the *Interagency Prescribed Fire Planning and Implementation Procedures Guide*, PMS 484. Rate each element in the following table with an "S" for Satisfactory or "U" for Unsatisfactory. Use Comment field as needed to support the element rating.

PRESCRIBED FIRE PLAN ELEMENTS	RATING	COMMENTS
1. Signature Page	S	
2. A. Agency Administrator Ignition Authorization	S	
2. B. Prescribed Fire GO/NO-GO Checklist	S	
3. Complexity Analysis Summary	S	
4. Description of Prescribed Fire Area	S	
5. Objectives	S	
6. Funding	S	
7. Prescription: Prescription Narrative and Prescription Parameters	S	
8. Scheduling	S	
9. Pre-Burn Considerations and Weather	S	
10. Briefing	S	
11. Organization and Equipment	S	
12. Communication	S	
13. Public and Personnel Safety, Medical	S	
14. Test Fire	S	
15. Ignition Plan	S	
16. Holding Plan	S	
17. Contingency Plan	S	Very Thorough
18. Wildfire Declaration	S	
19. Smoke Management and Air Quality	S	
20. Monitoring	S	
21. Post-Burn Activities	S	
Appendix A: Maps	S	
Appendix C: Complexity Analysis	S	
Appendix D: Agency-Specific Job Hazard Analysis or Risk Assessment	S	
Appendix E: Fire Behavior Modeling Documentation or Empirical Documentation	S	
Appendix F: Smoke Management Plan and Smoke Modeling Documentation (Optional)	S	
Other		

☒ **Approval is recommended** subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

☐ **Recommendation for approval is not granted**. Prescribed Fire Plan should be re-submitted for technical review subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

Technical Reviewer Signature: Jeremiah R Thatcher

Qualification and Currency: RXB2, 2021 last performed this position

Date Signed: 01/06/2022

Appendix C: Complexity Analysis

Prescribed Fire Complexity Rating System Guide Worksheet

Project Name SCHOFIELD BARRACKS MILITARY RANGE Prescribed Fire Plan

Complexity elements:

1. Potential for Escape

Risk	**Rationale**
Preliminary Rating: ***Low Moderate [High]***	Given a 20 mph 20ft wind, spot fires could ignite as far as 500 meters from the burn unit, on the outside of the main firebreak road, but this is very unlikely, because the recipient vegetation is shaded forest. Effectiveness of engines and ground personnel is limited to road edges and other areas cleared of UXO. Based on BEHAVE/CONTAIN runs, effective helicopter support will be critical in containing spot fires outside the prescribed burn area.
Final Rating: ***Low [Moderate] High***	To mitigate for the possibility of fire spread through green areas of Guinea grass to areas outside the main firebreak road, additional brush truck and helicopters with increased capabilities (660 gallon bucket vs. 100 gallon bucket) were added as holding and contingency forces, and weather conditions under which the burn will occur were limited. First responding helicopter with water bucket is estimated to be on site within 7 minutes with supporting aircraft arriving within 12 minutes. Although the probability of ignition of a spot fire remains low, the holding forces are substantial and the largest spot fire acreage will be small, based on observations of fire under more severe conditions in this fuel. Grass control efforts are being conducted in accordance with listed plant stabilization and the Integrated Wildland Fire Management Plan to slow the spread of fire in the vicinity of listed species and critical habitat. As implementation of these plans progresses and fuel breaks become better developed, risk of loss will decrease.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low [Moderate] High***	Federally listed fire-sensitive endangered and threatened plants and animals, and substantial areas of critical habitat are located upslope of the burn unit, outside the main firebreak road. Continued live fire training may be impacted if threatened and endangered species are damaged
Final Rating: ***Low [Moderate] High***	Areas of holding concern will be thoroughly prepped and inspected by the Burn Boss prior to ignition. Fire lines will be frequently patrolled to ensure that spot fires and slop-overs are quickly located and extinguished. Ignition patterns will be adjusted and/or the burn terminated if spotting becomes problematic and assigned resources become bogged down by frequent spotting or slop-overs. Additional onsite helicopter support capabilities have been added to reduce the probability of an escaped fire.
Technical Difficulty	**Rationale**

Preliminary Rating: ***Low*** ***Moderate*** ***High***	Ignition is scheduled to be completed prior to 2000 on a day when all of the spot weather forecast hourly parameters and fuel moisture conditions are predicted to be in prescription during all hours of the burn. Hand ignition and aerial ignition patterns will be moderately difficult to accomplish due to the presence of UXO limiting access to the burn area.
Final Rating: ***Low*** ***Moderate*** ***High***	While the use of additional engines and a bucket helicopter increases the reliability of holding operations, the presence of UXO will still limit the effectiveness of ground-based resources off the perimeter roads. A skilled weather observer will be necessary in order to monitor all of the current and expected weather and fuel moisture conditions to better ensure that burning conditions remain within prescribed limits during the burn. Hand ignition and aerial ignition with precise ignition patterns will occur to limit high intensity fire along the firebreak road system. Small sections of vegetation along the tree line will be ignited and may require immediate helicopter water bucket support prior to continuing interior ignition.

2. The Number and Dependency of Activities

Risk	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Coordination between blacklining operations and interior ignition operations will be required.
Final Rating: ***Low*** ***Moderate*** ***High***	A detailed firing plan will be discussed with all burn personnel at the pre-burn briefing. Coordination is easily maintained through radio communication.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Failure to coordinate interior ignition operations with holding (or perimeter firing) operations could result in either a high likelihood of escape and / or injury to assigned resources.
Final Rating: ***Low*** ***Moderate*** ***High***	The Burn Boss will ensure that adequate communications exist between burn personnel. Look outs may be posted where needed to facilitate communication and coordination. The Firing Boss shall maintain communications with ignition personnel and holding forces to ensure coordination of ignition operations. All personnel assigned to ignition will have a working radio.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Terrain may make visual contact difficult. Radio contact between ignition and holding forces will be necessary to maintain adequate coordination and reduce the risk of escape or injury.
Final Rating: ***Low*** ***Moderate*** ***High***	Communication plans have been established and identified in the burn plan and will be addressed day of burn in IAPs. Lookouts will be established where vision and communications may be impaired due to topography.

3. Off-Site Values

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Endangered species critical habitat, and endangered species could be threatened by a spot fire. Private land adjacent to Military boundary. Some structures are located adjacent to and within the range. Roads may be impacted by smoke.
Final Rating: ***Low*** ***Moderate*** ***High***	The parameters in this prescription were developed to minimize the risk of loss of off-site values in a spot fire. Pre-positioned ground firefighting assets on the firebreak road (60 ft. clear of all vegetation) and on Trimble road as well as UH60 helicopters on immediate standby will reduce risk. Aviation assets with increased capability (660 gallon buckets vs. 100 gallon buckets) will be utilized for this operation to limit fire spread potential. Fire lines will be patrolled to ensure that spot fires and slop-overs are quickly located and extinguished. Firing patterns and ignition techniques will take advantage of winds and topography to minimize threat to improvements on private or military lands adjacent to unit boundaries.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	The consequence of damaging critical habitat by escaped fire would be very high. Much of the existing wild individuals of some species may be extirpated by a large escaped prescribed burn. Future live fire training may be impacted if threatened and endangered species are harmed.
Final Rating: ***Low*** ***Moderate*** ***High***	Fire lines will be prepped and patrolled to reduce the risk of escape fires. Firing patterns and ignition techniques will help reduce the potential for spot fires and slop-overs. Mitigation efforts along the Fire break road have improved the fuel loading and composition such that spot fires are much more infrequent. Thereby reducing the overall potential impact to the critical habitat.

Technical Difficulty	Rationale
Preliminary Rating: ***Low Moderate [High]***	Steep slopes, flammable exotic grass fuels, unexploded ordinance, and multiple aircraft give suppression of spot fires high technical difficulty.
Final Rating: ***Low [Moderate] High***	Many factors affecting technical difficulties associated with control of spot fires cannot be mitigated. Full personal protective equipment including Kevlar helmet and Flak jacket will be used by Firefighters engaging a spot fire. Precise aerial ignition patterns will limit high intensity fire and spot fires along the firebreak road system. Pre-positioned ground firefighting assets on the firebreak road and on Trimble road as well as UH60 helicopters on immediate standby will reduce risk in the event of spot fires. Coordination between firing and holding operations is easily achieved, and will be maintained throughout the burn using radio communications.

4. On-Site Values

Risk	Rationale
Preliminary Rating: ***Low [Moderate] High***	There are Military values in or adjacent to the burn units Traffic on local roadways may be impacted by smoke.
Final Rating: ***Low [Moderate] High***	Military structures and improvements within the burn units will be prepped prior to ignition to help reduce potential impacts from fire. Resources will be pre-positioned at critical holding areas during the burn. Ignition around Military structures, improvements, and cultural sites will focus on low intensity backing fire to reduce the potential impacts from fire. Smoke warning signs will be placed on local roads at the discretion of the Burn Boss.

Potential Consequences	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Fire could damage Military structures and improvements if prep work and holding is unsuccessful. Smoke could impact traffic on local roads if outlined mitigation measures are not followed.
Final Rating: ***Low*** ***Moderate*** ***High***	The required prep work around structures and improvements is easily accomplished. Structures and improvements requiring protection will be identified on the project map in the IAP and discussed at the pre-burn briefing. A detailed firing plan will be discussed at the pre-burn briefing. Following the prescribed wind directions limits the potential for smoke closures.

Technical Difficulty	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Protection of Military structures and improvements will require coordination between firing and holding operations.
Final Rating: ***Low*** ***Moderate*** ***High***	The required prep work around structures and improvements is easily accomplished. Structures and improvements requiring protection will be identified on the project map in the IAP and discussed at the pre-burn briefing. Wooden structures will be treated with foam and fired out to increase the safety buffer if needed. Aerial ignition pattern will avoid placing high intensity fire near the concern areas. A detailed firing plan will be discussed at the pre-burn briefing.

5. Fire Behavior

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	High risk areas prone to spot fires with accumulations of grass on both sides of the firebreak road will require ignition early in the operation to take advantage of cooler burning conditions. High intensity fire adjacent to the firebreak road will need to be avoided
Final Rating: ***Low*** ***Moderate*** ***High***	In order to take advantage of cooler burning conditions when a spot fire's growth would be slowed by fuel moisture conditions, the burn will only be conducted when live herbaceous fuel moisture outside the burn units is 70% or higher at the Schofield Barracks weather station. The forest outside the firebreak road does not normally support high flame lengths or rapid rates of spread. Hand ignition will occur early in the operation to address areas prone to spot fires. The residual fire from the hand ignition will be allowed to burn approximately 60m down slope of the firebreak before aerial ignition is initiated. Burned grass areas remain hot and inaccessible to firefighters long after the fire front has passed. The risk of a large spot fire far from the burn unit can be mitigated by burning when live fuel moistures is over 100%, dead fuel moistures are relatively high, and predicted wind speeds are low.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Spot fires are a concern at Schofield, but spot fires that occur will be in forest fuel, with low rates of spread and flame lengths. Maximum spotting distance and spot fire size need to be minimized by burning under light wind conditions.
Final Rating: ***Low*** ***Moderate*** ***High***	Hand ignition will occur in all areas adjacent to the firebreak road at risk of spot fires. The residual fire from the hand ignition will be allowed to burn 60m down slope of the firebreak before aerial ignition is initiated. Adequate ground and air resources will be committed to support the ignition operation.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Limited types, kinds, and numbers of resources will be required to implement the prescribed burn. Standard safety practices will be effective, safety zones identified and easily accessed. Direct attack utilizing Aerial resources should be effective at controlling spot fires.
Final Rating: ***Low*** ***Moderate*** ***High***	Weather conditions will be continuously monitored throughout the operation to assure burn prescription parameters are met. If weather conditions exceed the burn prescription, all ignitions shall cease.

6. Management Organization

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Several overhead positions will require fully qualified personnel; Burn Boss Type 2 (RXB2), Firing Boss (FIRB), Incident Commander Type 5 (ICT5), Engine Operator (ENOP) or Engine Boss (ENGB), and a Fire Effects Monitor (FEMO). Span of control will be appropriate for the expected complexity.
Final Rating: ***Low*** ***Moderate*** ***High***	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Problems related to supervision or communication may cause failure to meet burn objectives or lead to an increased chance of escaped fire.
Final Rating: ***Low*** ***Moderate*** ***High***	Span of control will not be exceeded, and fully qualified personnel will occupy overhead positions. When and where trainees are used, fully qualified personnel will be assigned as trainers; trainers will have no additional duties.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Most burn personnel are expected to be from the ARMY Fire crew and are familiar with the burn unit and local conditions. Personnel from other Agencies, or organizations may be utilized provided they meet all NWCG requirements.
Final Rating: ***Low*** ***Moderate*** ***High***	No change.

7. Public and Political Interest

Risk	Rationale
Preliminary Rating: ***Low Moderate High***	This area is not very controversial; however recent poor media coverage regarding fires at Schofield and Helemano has raised public concern.
Final Rating: ***Low Moderate High***	Press releases may be issued to local media. While interest may be high, no public or political controversy is expected as long as the Prescription is followed, and smoke managementis implemented as described throughout this plan. PAO shall provide a public announcement of the Army's intent to conduct the prescribed fire. Regardless of the success of prescribed burns, Army activity at Schofield is likely to remain a concern to many interest groups.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low Moderate High***	Any fire that escapes into the endangered plant or animal population, or any area of plant or animal critical habitat could be subject to litigation. This litigation could hinder future military live fire training and prescribed burning at Schofield.
Final Rating: ***Low Moderate High***	Adverse effects should be prevented by using the mitigation measures outlines in this plan. Please refer to the On-Site and Off-Site values sections of this Complexity Analysis.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low Moderate High***	Army public relations office will work with the public and media to engender support for the prescribed burn. Prescribed weather and fuel moisture conditions must be substantially limited, and suppression forces must be substantial to ensure that resources are protected.
Final Rating: ***Low Moderate High***	Public relations are necessary, coordination of substantial fire suppression resources are scheduled to ensure that endangered species are not damaged by the prescribed burn. Weather conditions will be continuously monitored throughout the operation to assure burn prescription parameters are met. If weather conditions exceed the burn prescription, all ignitions shall cease

8. Fire Treatment Objectives

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	The continuous grass fuel burns readily, however, at high live fuel moistures, burns have historically been patchy. Burn area includes all areas within North/South Firebreak and Range Road.
Final Rating: ***Low*** ***Moderate*** ***High***	Objectives are readily achieved using low to moderate intensity fire. Herbicide treatments may help to achieve the management goals by pre-treating-killing the vegetation prior to burn implementation. Long term monitoring will be conducted in the burn unit.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Failure to achieve management objectives could result in long term effects, such as unwanted accidental wildfire and damage to critical habitat from said wildfires.
Final Rating: ***Low*** ***Moderate*** ***High***	Objectives can be readily achieved using low to moderate fire intensities.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Monitoring is necessary during the burn to ensure that objectives are being met. Aerial Ignition with hand ignition should increase the potential of meeting burn objectives.
Final Rating: ***Low*** ***Moderate*** ***High***	Once handline is created and reinforced by air then the FIRB will monitor fire behavior in the tree line leaf litter before continuing interior ignitions

9. Constraints

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Funding is a constraint. We can mitigate by completing the project efficiently. Weather is a constraint unanticipated changes in weather will present serious prescribed fire containment issues. All DES emergency vehicles must be fully mission capable. Firebreak maintenance must be conducted prior to the prescribed fire operation.
Final Rating: ***Low*** ***Moderate*** ***High***	Adequate funding is provided and burning in the early morning on a day with light winds will reduce the risks to an acceptable level. A spot weather forecast with forecasted weather for each hour during the burn will substantially reduce the chance of a weather parameter exceeding prescribed fire conditions.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	If funding is not obtained or weather conditions don't meet the prescription, then the burn will be postponed. If emergency vehicles are not fully mission capable the burn will be postponed.
Final Rating: ***Low*** ***Moderate*** ***High***	Coordination with the ARMY and through DES should remediate any concerns of funding. The burn is a high priority for the ARMY. Weather conditions will be continuously monitored throughout the operation to assure burn prescription parameters are met. If the spot weather forecast called for all weather conditions to be in prescription for the duration of the burn and one hour after ignition, and the fire escapes due to an unexpected weather event, the Army does not bear such a burden of blame for the escape. Equipment will be maintained throughout the year.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Constraints may increase the difficulty associated with completing the project. Coordination with the ARMY and other resources and departments is easily accomplished and should reduce conflicts.
Final Rating: ***Low*** ***Moderate*** ***High***	Constraints are not expected to increase the difficulty associated with completing the project.

10. Safety

Risk	Rationale
Preliminary Rating: ***Low Moderate [High]***	High concentrations of Unexploded ordinance (UXO) in impact area and Range Road. Depleted Uranium (DU) rounds also exist in the impact area. UXO may detonate when it is burned. Air and ground resources are on different radio frequencies. Snags (falling) limbs and trees present high risk to ground resources.
Final Rating: ***Low [Moderate] High***	We utilize EOD (Explosive Ordinance disposal, working in conjunction with the Firefighters to help eliminate potential risks associated with UXO. Kevlar vests and helmets are mandatory while in burn unit. LCES will be in place and discussed at daily briefings and AARs. Smoke impacts will be monitored throughout the burn period. Please see Elements 7, 9, 13, 17, and 19 for smoke mitigation measures.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low Moderate [High]***	There is a high potential for accidents or injury to burn personnel mostly related UXO.
Final Rating: ***Low [Moderate] High***	With the help of EOD on site walking ahead of the firefighters and visually searching for UXOs as we go will help to reduce the risk of injury. Keeping firefighters away from UXOs can help reduce the negative consequences.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low Moderate [High]***	Depleted uranium (DU) is located within the Radiologically Controlled Area (RCA). Limit exposure to all personnel. Personnel entering the RCA will be frisked on the way out to eliminate DU contamination. Location of UXO and snags cannot be accounted for 100%.and close coordination with EOD is required.
Final Rating: ***Low [Moderate] High***	Daily briefings will address safety concerns and mitigation measures. Briefings will be provided to all resources to ensure understanding of the mitigation measures needed to minimize risk associated with UXO. All personnel entering high hazard areas will wear personnel protective equipment (fire PPE, Kevlar helmet, flak jacket, and respirator). MSE range control will provide clear guidance on clear/uncleared areas. All personnel working close to UXO contaminated will have the following training: Depleted Uranium (DU) training, UXO training.

11. Ignition Procedures/Methods

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Firing sequence and timing are somewhat critical and coordination will be required. Visibility on some units may be limited in areas due to topography and fuels.
Final Rating: ***Low*** ***Moderate*** ***High***	Radio communication is easily maintained and will mitigate concerns where visibility is limited. The unit is very open so Radio Transmissions should have little to no interference. However, failure to communicate movement and completion status myimpact other ignitions.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	The coordination of firing efforts must be maintained to meet objectives and provide for safety of personnel and minimize potential for escape or spotting.
Final Rating: ***Low*** ***Moderate*** ***High***	Firing operations will be discussed at the pre-burn briefing. Fire behavior and ignition patterns shall be monitored closely by the ignition boss on both Divisions and Range Road. Aerial ignition will not exceed the capabilities of holding resources. Adequate ground/air resources will be available on site to provide a quick response if ignition escapes the established control lines.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Ground ignition will be used for securing the perimeter of the burn unit. Coordination of efforts and adjustments to timing will be necessary to meet burn objectives.
Final Rating: ***Low*** ***Moderate*** ***High***	Coordination of firing operations is easily accomplished but will require monitoring throughout the burn. Because holding will rely heavily on the use of helicopter bucket operations, the technical difficulty of ignition remains moderate. Firing operations will be discussed at the pre-burn briefing.

12. Interagency Coordination

Risk	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Army staff is required to maintain cooperative agreements and have protocols in place for ordering resources to fill prescribed fire positions.
Final Rating: ***Low*** ***Moderate*** ***High***	All mutual aid agreements are in place. The Army has protocols in place for ordering Army and civilian contract helicopter support, and assistance from Navy Fed Fire Department, PTA firefighters from the Big Island. Substantial coordination with National Weather Service, US Fish and Wildlife Service, State Clean Air Branch, Honolulu Fire Department, State Division of Forestry and Wildlife, and Navy Federal Fire Department, PAO, Safety Office, and Military Police will occur to assure all agencies are notified of the prescribed fire
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Most burns can be accomplished using ARMY FIRE personnel. High dependency on the aviation support provided by the ARMY. Coordination with partners is required so any issues need to be resolved quickly.
Final Rating: ***Low*** ***Moderate*** ***High***	Interagency coordination issues may arise due to scheduling conflicts, or lack of contingency resources, which could delay completion of the project.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	There are no special interagency agreements needed for the projects outlined in this plan. MOU's and Mutual Aid Agreements are maintained yearly.
Final Rating: ***Low*** ***Moderate*** ***High***	Aviation assets and scheduling conflicts could arise requiring assistance.

13. Project Logistics

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Many logistical tasks must be completed ahead of time to ensure that all needed supplies and equipment are on site for the burn. Helicopter fuel must be available at Wheeler Army Airfield (WAAF) during the burn.
Final Rating: ***Low*** ***Moderate*** ***High***	Fuel requirements will be in place to conduct fueling at WAAF. Contract helicopters will have commercial aircraft landing permits and fuel purchase agreements approved and in place. Available hydrants will be identified for refilling emergency vehicles.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Logistical support problems may affect completion of project.
Final Rating: ***Low*** ***Moderate*** ***High***	Logistical concerns should be easily handled by burn personnel and/or ARMY staff.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Emergency vehicles, fire water buckets, dip pond, helicopter fuel at WAAF must be in place to conduct the prescribed fire.
Final Rating: ***Low*** ***Moderate*** ***High***	Water buckets will be FMC prior to prescribed fire. Additional backup water buckets will be available on site. Water buckets replacement parts have been ordered to conduct repairs. Dip pond are maintained and ready. Helicopter landing permits and fuel purchase agreement are in place with WAAF fueling station.

14. Smoke Management

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Smoke may impact local roadways. However, very little traffic is expected in the Schofield area so early in the morning. Good daytime dispersion will minimize smoke on road. Residual smoke will be limited due to rapid consumption of grass fuels.
Final Rating: ***Low*** ***Moderate*** ***High***	Smoke signs will be in place and traffic control personnel may be used. Burns may be terminated or road closures enforced if smoke impacts create unsafe driving conditions. Military Police patrols will continuously monitor smoke conditions on roads and take appropriate actions to ensure safe vehicle operating conditions. Refer to Elements 7, 9, 13, 17, and 19 for smoke management information.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Smoke may impact local roadways. An accident on the public paved road resulting in injury or private property damage could be blamed on a smoke-related visibility issue. Need to monitor and document smoke and visibility on the highway during the prescribed burn. Firefighters may experience heavy smoke concentrations and need to be rotated into fresh air.
Final Rating: ***Low*** ***Moderate*** ***High***	No change, and refer to Elements 7, 9, 13, 17, and 19 for smoke management information.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Impacts to local roadways are possible and mitigation measures will be necessary.
Final Rating: ***Low*** ***Moderate*** ***High***	The wind and smoke dispersion parameters in Element 7 should be adequate to reduce the potential smoke impacts to local roads and communities. The mitigation measures outlined in Elements 7, 9, 13, 17, and 19 should be adequate for reducing safety concerns due to smoke.

COMPLEXITY RATING SUMMARY

RISK	OVERALL RATING	**Moderate**
POTENTIAL CONSEQUENCES	OVERALL RATING	**Moderate**
TECHNICAL DIFFICULTY	OVERALL RATING	**Moderate**
SUMMARY COMPLEXITY RATING		**Moderate**

RATIONALE:
This project has been given a moderate rating due to the risk of spot fires, the potential Safety issues concerning UXO, and for smoke impacts to local roadways and residences.

The primary concern to firefighter safety is the UXO in the unit, however with coordination with EOD and the safety procedures outlined in **Appendix D** will help mitigate some of the risk associated with Prescribed Fire operations on the Range.

The potential for spotting or an escaped fire has been reduced by stacking heavy with aviation resources. Utilizing the heavy helicopters with the line production capabilities, as outlined in the *Adequate Holding Forces* worksheet in **Appendix G**, allow for a higher probability of success in extinguishing any spot fires or slop-overs.

Smoke impacts to motorist visibility are a concern, due to the proximity to public roadways. Refer to Elements 7, 9, 13, 17, and 19 for mitigation measures to reduce smoke impacts from burning. Wind direction, Daytime and Nighttime mixing heights and transport wind levels will be monitored closely before, during and after the burn to ensure public and firefighter safety.

Operations will normally be conducted with ARMY Fire staff in the critical overhead positions. Span of control will not exceed standard protocols, and the need for qualifications at the strike team or task force level in the regular burn organization is not anticipated.

No special logistical concerns are anticipated. The treatment areas are readily accessible by burn personnel and contingency resources. Some limited logistical and supply functions may be provided by staff from the fire management office, if necessary, but none are expected to exceed the capability of the existing support staff.

Prepared by: Justin Turnbo Date: 01-07-2022
Justin Turnbo, RXB2
Wildland Fire Management Officer, U.S. ARMY Hawaii

Approved by: Alex H. Temporado Date: 01-26-2022
Alex Temporado
ARMY Fire Chief, U.S. ARMY Hawaii

Appendix D: Agency-Specific Job Hazard Analysis or Risk Assessment

U.S. Department of Defense ARMY Fire	1. WORK PROJECT/ACTIVITY Prescribed Fire Operations	2. LOCATION U.S. ARMY Garrison HI Schofield Barracks	3. UNIT SCHOFIELD BARRACKS MILITARY RANGE
JOB HAZARD ANALYSIS (JHA) References-DM-18, RM18, Fireline Handbook, Interagency Prescribed Fire Planning and Implementation Procedures Ref. Guide	4. NAME OF ANALYST Justin Turnbo	5. JOB TITLE Fuels Management Specialist	6. DATE PREPARED 10-15-2023

7. TASKS/PROCEDURES	8. HAZARDS	9. MITIGATION
***Travel to, from and on Project.**	Motor vehicle accidents Slippery road surfaces, soft shoulders, unimproved and narrow roadways. Weather darkness, smoke.	Driving Defensively. Use seat belts. Identify road conditions and hazards during briefings. Use Headlights and overheads. Perform preuse inspections on equipment. Scout roads and identify turnouts before ignition of project. Maintain communications. Provide road system map for project. Use Backers and chock vehicle tires. Have vehicles facing out.
***Qualifications For assigned Position**	Lack of Experience Injuries	Workers used on burn assignments shall meet age, health, and physical requirements established for arduous firefighting duties. Positions will be filled using fully qualified persons or trainees meeting 310-1 requirements AND be assigned with a dedicated trainer.
***Briefing**	Lack of communications	Provide an operational briefing before each shift. Briefing will clarify organization, responsibilities, communications, hazards, weather, expected fire behavior, and medical plan.
***Protective Clothing and equipment**	Injuries, burns and death	Wear Hard hat with chin strap, safety glasses, Nomex Fire resistant pants and shirts NFPA 1977 compliant. Keep sleeves rolled down. Wear leather, lace type, boots with skid resistant soles, and tops at least 8 inches high. Carry drinking water and fire shelter. Wear OSHA approved firefighting gloves. Wear hearing protection when working around equipment where noise level exceeds 90 dba. Wear additional protective equipment as dictated by local conditions and exposure to special equipment.
***Lighters**	Injuries and death, falls,snags,bees, smoke, burns, rolling material.	Always have an escape route. Maintain LCES. Follow the Standard Fire Orders and Watch Out Situations. Maintain communications with other Lighters and Firing Boss. Hand held radios shall be provided to all lighters. Do not fill drip torches near ignition sources. Avoid spilling drip torch fuel on clothing.
***Fuel Mixing**	Burns, spills, fuel saturated clothing and boots.	No smoking within 25 feet of mixing and filling area. Do not fill or mix in pick up beds with bed liners. Avoid the use of cellular telephones in and around fill or mixing area. Avoid fuel contact with bare hands, clothing and boots. Provide pour spouts. Use only approved fuel containers for storage and transport.

***Holding/Mop Up/Patrol Crews**	Smoke, burns, Falls, back injuries, bees, poison oak, snags, rolling material, eye injuries. Heat Stress. Dehydration CO Poisoning	Wear PPE's listed above. LCES, Follow Standard Fire Orders and Watch out Situations. Identify hazards in work area. Flag hazards for others. Use warning lights and provide traffic control on roadways during smoky and night operations. Maintaining a high level of aerobic fitness is one of the best ways to protect yourself against heat stress. Drink lots of fluids before, during and after work. Periodically rotate crews from work sites with high smoke levels to areas of less smoke or smoke free areas. Protective clothing and equipment shall be the same as required for firefighting. Crews shall follow all guidelines in the NWCG Fire line Handbook Chapter 5 Firefighting Safety (Rev. 3/2004 or latest). Maintain communications with the Firing Boss.
***Hand Tools**	Puncture wounds, cuts, splinters	Ensure tools are maintained in safe condition through regular inspection and maintenance. Monitor employee performance to ensure safe practices are employed. Maintain safe distances between personnel when working or hiking. Keep tools sheathed when not in use. Properly store tools for transport.
***Chain Saw Operation**	Inexperienced operators, snags / widow makers, saw cut injuries, falling hazards	Sawyers and swampers shall have completed S212 and be red carded or under the supervision of a qualified sawyer. Call out appropriate warnings during falling operations. Be aware of adjacent ongoing operations and crews, warn all on site personnel of pending falling operations and locations. Be aware of and maintain situational awareness of snags, broken limbs, and hang-ups. Use spotters. Sawyers and swampers shall where all required PPE including chaps. Avoid contacting bar tip with objects to reduce potential for kick-back. Use proper felling techniques and procedures.
***Portable Pump Operation**	Burns from pump motor, refueling hazards, draft site injuries, back injuries	Operator must have completed S211. Ensure pump is set up correctly and in a secure position. Use proper lifting and carrying techniques, ask for assistance. Watch footing around water sources, be alert for slip hazards. Allow for required warm-up and cool down times during use. Ensure pump has cooled prior to refueling. Where hearing protection when operating pump. Advise other personnel prior to shutting down or starting up pump.
***ATV Operation**	Roll over, accidents	ATV operators shall be certified for ATV use. Maintain safe operating speeds for the conditions. Avoid side hill situations. Do not overload racks in order to reduce instability issues. Where approved helmets when not on burn units, or hard hats with chin straps when on burn units. Full PPE Required for operation.
***UTV Operation**	Roll over, accidents	Only personnel who have been certified for UTV use may operate one. Regular firefighting PPE will be used. Gloves on. Chinstrap down. Eye protection. Avoid over-loading cargo racks. UTV's with heavy loads or awkward attachments should stay off of steep or uneven terrain.
***Emergency Evacuation Procedures (EEP)**	Serious illness injuries	Notify Burn Boss, request medical response from the responsible medical first responders. Provide type of injury, location, access, number of patients. Verify local host park emergency response procedures. Identify First Responders, EMTs and available medical equipment on project during briefing.

10. LINE OFFICER SIGNATURE	11. TITLE	12. DATE

(over)

JHA Instructions

The JHA shall identify the location of the work project or activity, the name of employee(s) writing the JHA, the date(s) of development, and the name of the appropriate line officer approving it. The supervisor acknowledges that employees have read and understand the contents, have received the required training, and are qualified to perform the work project or activity.

Blocks 1, 2, 3, 4, 5, and 6: Self-explanatory.

Block 7: Identify all tasks and procedures associated with the work project or activity that have potential to cause injury or illness to personnel and damage to property or material. Include emergency evacuation procedures (EEP).

Block 8: Identify all known or suspect hazards associated with each respective task/procedure listed in block 7. For example:

a. Research past accidents/incidents
b. Research the Health and Safety Code, or other appropriate literature.
c. Discuss the work project/activity with participants
d. Observe the work project/activity
e. A combination of the above

Block 9: Identify appropriate actions to reduce or eliminate the hazards identified in block 8. Abatement measures listed below are in the order of the preferred abatement method:

a. Engineering Controls (the most desirable method of abatement). For example, ergonomically designed tools, equipment, and furniture.
b. Substitution. For example, switching to high flash point, non-toxic solvents.
c. Administrative Controls. For example, limiting exposure by reducing the work schedule; establishing appropriate procedures and practices.
d. PPE (least desirable method of abatement). For example, using hearing protection when working with or close to portable machines (chain saws, rock drills portable water pumps)
e. A combination of the above.

Block 10: The JHA must be reviewed and approved by a line officer. Attach a copy of the JHA as justification for purchase orders when procuring PPE.

Blocks 11 and 12: Self-explanatory.

Emergency Evacuation Instructions

Work supervisors and crew members are responsible for developing and discussing field emergency evacuation procedures (EEP) and alternatives in the event a person(s) becomes seriously ill or injured at the worksite.

Be prepared to provide the following information:

a. Nature of the accident or injury (avoid using victim's name).
b. Type of assistance needed, if any (ground, air, or water evacuation)
c. Location of accident or injury, best access route into the worksite (road name/number), identifiable ground/air landmarks.
d. Radio frequency(s).
e. Contact person.
f. Local hazards to ground vehicles or aviation.
g. Weather conditions (wind speed & direction, visibility, temp).
h. Topography.
i. Number of person(s) to be transported
j. Estimated weight of passengers for air/water evacuation.

The items listed above serve only as guidelines for the development of emergency evacuation procedures.

JHA and Emergency Evacuation Procedures Acknowledgment

We, the undersigned work leader and crew members, acknowledge participation in the development of this JHA (as applicable) and accompanying emergency evacuation procedures. We have thoroughly discussed and understand the provisions of each of these documents:

SIGNATURE	DATE	SIGNATURE	DATE
Work Leader			

SAFETY PLAN FOR ENTERING HIGH HAZARD AREAS

WILDLAND FIRE SUPPRESSION
AND EXPOSURE TO HAZARDOUS TERRAIN

1. INTRODUCTION.

a. Objective: This Safety Plan (SP) was prepared in response to requirements produced by the Directorate of Installation Safety (DIS) for personnel entering and conducting work within a High Hazard Area (HHA). All personnel conducting operations under this SP must read and understand the applicable parts of this SP prior to commencing work.

b. Scope of Work: Entering and working in and around HHAs, Wildland Fire Suppression, and Exposure to Hazardous Terrain.

c. Site Location: All ranges at Schofield Barracks Training Areas (Kahuku, Kawailoa, Dillingham, East Range, and South Range), Makua Military Reservation (MMR), Pohakuloa Training Area (PTA), and to include all fire access roads.

d. Applicability: This SP applies to all personnel entering an HHA.

2. RESPONSIBILITY: The Director, DES, is directly responsible for overseeing that all applicable rules and regulations are complied with, and that all necessary safety precautions are taken to operate in accordance with this SP. The DES will ensure all personnel conducting activities in accordance with this SP have the proper training and, if required, the proper certifications for the job being performed.

a. Safety Officer: The appointed Safety Officer (SO) will ensure that individuals on-site adhere to this SP. The SO will be responsible for conducting safety briefings. The SO has the authority to stop work if an unacceptable risk is identified.

b. Safety Briefings: Safety briefings for all personnel on-site will be conducted by the SO each morning prior to the start of work or as frequently as needed, depending on the hazards observed on site. Prior to this briefing, the SO will obtain information on the daily objectives, procedures, and equipment that may be used on site. The briefing will address the particular hazards to be controlled for that day. The SO will assess the new hazards and assure that the methods to control these hazards are communicated to the people on the project site. The briefing shall review this SP and the following topics.

(1) Proper Protective Equipment.
(2) Emergency response procedures.
(3) Motor vehicle safety and operation restrictions.
(4) Known and potentially hazardous conditions.
(5) Prevention of heat stroke.
(6) Procedures for encountering Unexploded Ordinance (UXO).

3. AUTHORITY: The Range Officer, Range Division, Hawaii, is the first level of authority for approving entry into HHAs. During emergency situations when the Range Officer is not present, the senior person on duty or on call may authorize entry into hazard area, hazardous terrain, and areas where firefighting is required.

4. TRAINING:

a. All personnel entering an HHA will be trained in the recognition of UXO.

b. Only Army Fire Department (AFD) personnel and properly trained and qualified personnel will respond for fire suppression operations.

5. ANTICIPATED HAZARDS: Working in HHA can present a range of safety concerns, some of which could possibly result in serious injury or death. Certain hazards are a function of the physical nature of the project area itself, while others are a direct consequence of the work being performed.

6. PHYSICAL HAZARDS: Efforts will be made through training to inform individuals of the potential site hazards (ditches, uneven terrain, etc.) and their responsibility to immediately inform the SO of any new hazards so that, if possible, corrective action can be quickly taken to eliminate the safety problem.

7. HEAT STRESS: All employees should be aware of the signs and symptoms of heat stress. Heat stress can occur when protective clothing impairs the body's ability to regulate temperature, thus producing stress on the body. Excessive exposure to a hot work environment can bring about a variety of heat induced disorders.

a. Heat stroke is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature-regulatory system fails and disrupts sweating. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached. Heat stroke victims appear dry and at times spotted red, the body temperature is usually at 105 degrees or higher, and the individuals are usually mentally confused, go into convulsions, and eventually become unconsciousness. If treatment is not received immediately, death may occur. If any individual displays signs or symptoms of heat stroke, then the individual will require first-aid and should immediately be hospitalized to reduce the body's temperature. The body temperature can be brought down by soaking the individual's clothing in water and vigorously fanning the individual's body.

b. Heat exhaustion is caused by an impaired circulatory system (shock), induced by heat stress. Heat exhaustion involves the loss of large amounts of bodily fluid by sweating, accompanied by an excessive loss of salt. The individual may also experience weakness and fatigue, nausea or headaches. Heat exhaustion victims should be placed in a cool shady area, and liquids should be replenished. The liquid of choice is either cool water or fluids with electrolytes, such as Gatorade.

c. Heat Cramps are a combination of painful muscle spasms in the leg, arm, and abdomen. Their onset is caused by exposure to heat, which causes the depletion of body salts through excessive or profuse sweating. Consumption of water alone may not prevent the occurrence of heat cramps. Heat cramps may occur during or after work hours and may be relieved by taking in salt through either food or electrolyte fluids.

d. Heat Stress Prevention.

(1) Minimize heat in the workplace if working indoors. Individuals working outdoors should be gradually acclimatized to the hot environment. It will usually take between 5-7 days to acclimatize an individual.

(2) Adjust the work schedule to cooler working hours *(e.g.* from day to night shift).

(3) Modify work rest schedules.

(4) Maintain body fluids and salt intake.

(5) The main key to the prevention of heat stress is education. Individuals must abide by the fluid replacement guide for warm weather and implement the work rest schedule.

8. BIOLOGICAL HAZARDS: Biological hazards may arise from contact with insects *(e.g.,* mosquitoes, scorpions, bees or wasps), vermin, plants, feral animals *(e.g.,* dogs, pigs, cats, etc.), and soil-borne or waterborne bacteria *(e.g.,* fungi and viruses). The first-aid kit will be equipped to respond to minor bites, stings, or scratches. Any personnel with major injuries will be transported to the nearest medical facility.

9. UNEXPOLODED ORDNANCE (UXO) AND ASSOCIATED RESIDUE:

a. When a suspected UXO is found, the location of the UXO will be marked. The SO and EOD technician will be notified of the presence and location of the UXO. All operations in the calculated bursting radius of the UXO will cease, and the area evacuated.

b. The site will be controlled by the EOD technician until the UXO is neutralized. The EOD technician will notify personnel when the UXO is eliminated.

c. When non-explosive-loaded or ordnance components are located, it should be annotated and EOD notified for future removal by an EOD technician.

10. PERSONAL PROTECTIVE EQUIPMENT (PPE).

a. The following PPE is required when entering a known HHA:

(1) Kevlar vest.
(2) Kevlar helmet with chin strap.
(3) Boots with proper ankle support.

b. The following PPE is required for fire suppression:

(1) Nomex shirt, pants or jumpsuit.
(2) Leather boots.
(3) Leather gloves or cotton gloves with leather face.
(4) Helmet or hard hat with chin strap.
(5) Goggles and approved safety glasses.
(6) Fire Shelter

11. COMMUNICATIONS: Radio communications will be maintained at all times.

12. ACCIDENT REPORTING: All accidents will be reported on 25th ID & USAG-HI Form, Army Ground Accident Report (AGAR), submitted to the DIS within 7 hours of the accident via facsimile machine to (808) 655-6654. The DIS will inform of any further reporting requirements.

DELIBERATE RISK ASSESSMENT WORKSHEET

1. MISSION/TASK DESCRIPTION	2. DATE (YYYYMMDD)
SBMR Prescribed Fire	20231115

3. PREPARED BY

a. Name (Last, First Middle Initial)	b. Rank/Grade	c. Duty Title/Position
Turnbo, Justin L	CIV/GS 11	DES Wildland Fire Program Manager

d. Unit	e. Work Email	f. Telephone *(DSN/Commercial (Include Area Code))*
DES W/L Fire	Justin.L.Turnbo.civ@army.mil	808-798-6579

g. UIC/CIN *(as required)*	h. Training Support/Lesson Plan or OPORD *(as required)*	i. Signature of Preparer:

Five steps of Risk Management: (1) Identify the hazards (2) Assess the hazards (3) Develop controls & make decisions (4) Implement controls (5) Supervise and evaluate *(Step numbers not equal to numbered items on form)*

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
☐ ☐ + -	Prescribed Burning	1. Unexploded Ordnance (UXO) detonation during prescribed fire (hearing loss, trauma, or fatality)	EH	Limit exposure to UXO by positioning trucks and personnel on the uphill side of firebreak roads. Personnel who enter High Hazard Areas (HHA) will comply with the following: Be trained in UXO recognition and have current CPR and first aid training. Never touch UXO or unidentified objects. Wear flak vest and helmet if UXO present Keep to the black (previously burned area) when it is safe to do so – it is easier to identify UXO. Not key radios within 15 meters of known UXO. No personnel will enter the residual impact area. Maintain good situational awareness. Location of UXO cannot be mitigated 100% within the live fire training range, Residual risk remains High due to increase probability of UXO detonation during the prescribed fire.	How: All personnel committed to wildland fire incidents shall be briefed and follow : AR 385-63, EOD SOP, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan Who: Burn Boss/Crew Supervisor shall assure all personnel have been briefed and possess appropriate PPE.	H

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Prescribed Burning	2. Terrain	H	Conditions of roads, trails, and paths will be assessed and briefed prior to any movement Recognize loose soil and vegetation. Movement through tall grass should be avoided. If movement must go through tall grass the area will be surfaced cleared by EOD.	How: All personnel committed to wildland fire incidents shall be briefed and follow : AR 385-63, EOD SOP, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan Who: Burn Boss and Crew Supervisor shall brief and monitor terrain conditions	M
+ -	Prescribed Fire	1. Weather	H	A spot weather forecast will be ordered each day until fire is 100% contained and afterward at IC's discretion. Spot weather forecast shall provide hourly estimates for wind speed, wind direction, temperature, and humidity. During days of hot temperatures personnel will properly hydrate before, during, and after operations also implement work/rest plan. If weather affects visibility, personnel will not enter HHA. Avoid areas where rain has created mud or standing water. Avoid streambeds and low lying areas known for flash flooding during times of heavy rain. Continuously monitor weather conditions with hand held equipment, RAWS, local forecasts, and spot weather forecasts by National Weather Service.	How: All personnel committed to the incident shall be briefed on weather fore-cast and the need to hydrate properly. Hourly weather conditions shall be documented and com-municated to Firefighters via radio Who: Burn Boss and Crew Supervisor shall monitor weather and Firefighters	M

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Prescribed Fire	Vehicle Movement	M	Drivers will be properly licensed and will PMCS vehicles prior to daily operations. Vehicles will only be operated on existing roads/trails and will not be operated in areas that have not been surfaced cleared for UXO. Ground guides will be used when backing vehicle and in areas of limited visibility. Vehicles will not be operated in areas that exceed the drivers experience level.	How: AR 385-55, AR 600-55, SOPs, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan (DES will provide safety oversight of controls.) Who: Burn Boss and Crew Supervisor shall monitor	L
+ -	Prescribed Fire	Radiant Heat	H	Proper PPE will be worn. - Nomex Shirt & Pants or Jumpsuit - Safety Goggles - 8" Leather Boots - Leather Gloves - Hard Hat or Helmet with chin strap - Nomex Hood - Fire Shelter - Flack vest and helmet if UXO present. Only trained, pack-tested, personnel will be in the fire area unless IC approves of person, such as GPS personnel, etc. Escape route and safety zones will be briefed. Weather and fire conditions will be closely monitored by a designated lookout. Flanking tactics shall be utilized by Firefighters on the ground when possible to avoid extreme fire behavior at the head of the fire.	How: AR 385-10, CFR 1910.132-138, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan. Schofield Prescribed Burn Plan. Who: Burn Boss/Division Supervisors shall monitor personnel for dehydration and heat exhaustion, ensure LCES is in place. Assure correct fireline tactics are implemented.	M

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Prescribed Fire	Fire suppression	H	Chainsaws will be operated only by qualified personnel. Saw operator and swamper will wear chaps, eye and ear protection. Briefing shall be conducted at the start of every shift. A spot weather forecast shall be ordered each day until the fire is 100% contained. Only trained, pack-tested personnel will be on the fireline unless approved by the IC. Incident Commander shall establish and maintain communication with everyone on the fireline and with the EOC. Escape routes and safety zones shall be established and known to all Firefighters. Full PPE shall utilized by all personnel on the fireline. Helicopters with water buckets will be used to suppress fire within residual impact area.	How: AR 385-10, CFR 1910.132-138, Range Division SOP, USARHAW Operational Guidance for Hazard Areas, USARHAW Wildland Fire Management Plan. Schofield Prescribed Burn Plan. Who: Burn Boss shall monitor personnel for dehydration and heat exhaustion, ensure LCES is in place. Assure correct fireline tactics are implemented	M
+ -	Prescribed Fire	Volatile fuel/vegetation-conditions. Impact to offsite values (threatened and endangered species/ critical habitat)	H	Pre-position ground fire resources on the firebreak road, establish onsite helicopter support to provide an immediate response. Increase ground/air capabilities. Utilize terrain features to segment the burn area into smaller burn units. Contain fire prior to moving to next burn unit. Improve the firebreak roads by establishing a 60 ft vegetation free corridor. Consult with USFWS and gain approval to conduct prescribed fire.	How: Mission and Garrison personnel must be notified of established timeframes for conducting prescribed fire. Requests to conduct prescribed fire outside of established time frame must be approved by a high level manager/supervisor. Utilize Combat Aviation Brigade for water bucket support. 2- UH60 and 1-Bell 407 on site. 1-CH47 and 1- UH60 on standby. Coordinate with 84th Engineers Battalion to improve fire break road. Coordinate with DPW Who: Burn Boss shall assure appropriate planning, coordination, and notifications are in place and adequate resources are on site and contingency resources are on standby.	M

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Prescribed Fire	Aerial ignition	M	Sphere dispenser operator shall be certified annually. Pilot and aircraft will be certified. Bench testing of the plastic sphere dispenser shall be done prior to mounting in the aircraft. Pilot, PSD operator, and firing boss shall have a fire shelter and wear appropriate PPE: Operator shall immediately notify the pilot and take appropriate action to correct malfunction with the machine. If malfunction cannot be corrected in the air the pilot will land the aircraft. If a fire occurs in the PSD machine that cannot be extinguished, the pilot will be notified and the machine will be jettisoned.	How: Interagency Aerial Ignition Guide (April 2001), AR 385-10, CFR 1910.132-138. Ignition Boss and PSD Operator shall complete operational checklist prior to mission. Who: Burn Boss/Ignition Boss shall monitor and provide oversight.	L
+ -	Prescribed Fire	Incident Command System (ICS) Lack of Command and Control	H	Identify qualified ICS personnel by position and name. If command changes, announce change by name on radio and obtain confirmation from everyone on the fireline and command post. Incident Command Post (ICP) shall be staffed with Prescribed Fire Administrator, Burn Boss, FED FIRE representative, Safety Officer. ICP will provide continuous communication with all prescribed fire resources and the EOC. Coordination with the National Weather Service, US Fish and Wildlife Service, State Clean Air Branch, Honolulu Fire Department, State Division of Forestry, Navy Federal Fire Department, PAO, Safety Office, and Military Police will occur.	How: NFPA 1561, Schofield Prescribed Burn Plan USAR HAW Wildland Fire Management Plan. ICP shall coordinate the prescribed fire. EOC will provide logistical support as needed. Burn Boss will assure coordination and planning is conducted with appro-priate agencies and directorates. Who: Burn Boss shall plan, coordinate, monitor and provide oversight	M

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Prescribed Fire	Escaped fire due to insufficient firebreaks.	H	DES will coordinate with DPW and the 84th Engineer Battalion to assure firebreaks are cut and adequate prior to the prescribed fire.	How: Improvement of fire-breaks will be scheduled during range maintenance days to lessen the impact on live fire training. Who: All DES personnel shall assist in coordination with DPW and 84th Engineer Battalion.	M
+ -	Prescribed Fire	Burn is postponed due to lack of adequate firefighting assets	H	All DES emergency vehicles must be fully mission capable. DES will work with DOL to assure all vehicles are repaired and returned to service in a timely manner. Funding has been provided for contract helicopter support. Coordination with CAB for helicopter support has occurred and both on site and standby aircraft will be in place for the water bucket mission.	How: Burn Boss will coordinate with DOL, RCO-HI, and CAB to assure adequate fire assets are in place Who: Burn Boss will complete coordination with DOL, RCO-HI and CAB.	M
+ -	Aviation Operations	Fire on personnel or equipment. Fuel spill results in environmental damage or hazard	H	Qualified personnel operate equipment. Proper equipment utilized for the operation. Appropriate PPE worn during operation. Emergency plan (fire and spill) briefed and rehearsed prior to execution. Cold (engine shutdown) refuel is the only authorized method of refuel.	How: Refuel plans and proce-dures briefed and fol-lowed. Refuel site and operation inspected prior to execution. Who: Burn Boss shall initially inspect the site. Helicopter manager shall be assigned to landing zone.	
+ -	Aviation Operations	Aircraft mishap during operations in the LZ or in the AOR.	H	Pre-accident plan prepared and briefed. Command and control from C2 aircraft and incident command post. On site rescue personnel shall be provided.	How: Pre-accident plan and helicopter operations pro-cedures briefed prior to execution. Aviation Safety Manager shall inspect the helicopter landing zone prior to starting the operation Who: Burn Boss shall assure the helicopter LZ has ade-quate safety measures in place.	M

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Aviation – Flight operations during aerial ignition	Mid-air collision during helicopter operations	H	Airspace coordination from the C2 aircraft and the incident command post. Entry and Exit routes shall be clearly identified in the morning briefing. All helicopters shall utilize 122.925 for communication and shall report location on the fire	How: Continuous supervision during the operation. Aviation safety shall provide comprehensive oversight. Aircrews monitor operations and provide additional control. Who: Burn Boss and C2 aircraft shall monitor airspace. Aviation Safety shall provide guidance if changes are needed.	M
+ -	Aviation Operations in LZ	Personnel injured or equipment damaged by rotor wash or blade strike	H	Implement parking plan, keep non- essential personnel and equipment clear of LZ, safety briefings and appropriate PPE in the vicinity of aircraft. Establish appropriate safety circles around the pad markers.	How: Safety briefing shall be conducted prior to operations. Continuous supervision during operations. Aircrews monitor and provide additional controls Who: Burn Boss shall provide the initial briefing.	M
+ -	Aviation Operations in LZ	. LZ too small for operations or hazards/ obstructions in LZ	H	LZ inspection to confirm suitability for operation and check for aviation hazards. Establish appropriate safety circles around the pad markers.	How: Safety briefing shall be conducted prior to operations. Continuous supervision during operations. Aircrews monitor and provide additional controls Who: Burn Boss shall provide the initial briefing. Operation shall be supervised by Helicopter Manager and Aviation Safety Manager.	M
+ -	Aviation Operations	. Weather not suitable for mission execution or safe aviation operations	H	Establish minimum ceiling and visibility limits. Establish wind limitations. Continuous monitoring of weather.	How: Provide weather briefing to all helicopter personnel. Provide weather updates to all helicopter personnel Who: Burn Boss shall provide the initial briefing. Operation shall be supervised by Helicopter Manager and Aviation Safety Manager.	L

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Aviation Operations	Aircraft mishap due to aircraft performance and/ or external load operations	H	Use experienced crews to conduct the operation. Ensure clear understanding of task, conditions, and standards.	How: Utilize experienced crews. Thorough crew briefings, assure assignments are clear and understood. Aviation operations area brief to all personnel. Service provider ensures crews are experienced in the operation. Crews conduct briefings. Aviation safety conducts operations area briefing. Who: Burn Boss shall provide the initial briefing. Operation shall be supervised by Helicopter Manager and Safety Officer.	M
+ -	Fire Suppression in Radiological Controlled Area(RCA)	Airborne particles of depleted uranium	H	All personnel entering RCA will have depleted uranium training and shall carry a respirator on their line gear	How: Burn Boss and Crew Supervisor shall assure all personnel entering RCA have received training and have a properly fitting respirator. Planning/ coordination to place appropriate personnel in RCA as needed. Who: Gear check for compliance prior to operations on the Burn Day.	M
+ -	Fire Suppression in Radiological Controlled Area(RCA)	Transporting depleted uranium contaminants outside of RCA	H	All personnel and vehicles exiting RCA shall be screened by DU Trained personnel with a Geiger counter to assure contaminants do not leave the RCA.	How: Planning/coordination to assure DU support is available on ignition day and follow up mop up days. Who: Burn Boss shall assure DU procedures are briefed at the start of each shift	L

	4. SUBTASK/SUBSTEP OF MISSION/TASK	5. HAZARD	6. INITIAL RISK LEVEL	7. CONTROL	8. HOW TO IMPLEMENT/ WHO WILL IMPLEMENT	9. RESIDUAL RISK LEVEL
+ -	Public/Political interest	Prescribed fire operation that results in negative publicity.	H	Substantial coordination with National Weather Service, US Fish and Wildlife Service, State Clean Air Branch, Honolulu Fire Department, State Division of Forestry and Wildlife, and Navy Federal Fire Department, PAO, Safety Office, and Military Police will occur to assure all agencies are notified of the prescribed fire. PAO shall provide a public announcement of the Army's intent to conduct the prescribed fire. Regardless of the success of prescribed burns, Army activity at Schofield is likely to remain a concern to many interest groups. Additional ground and air support resources have been added to the prescribed fire. Helicopters with increased capabilities (660 gallon bucket vs. 100 gallon bucket) will be on site to effectively contain and control fire spread. Additional helicopters will be available (2 hour call back) to limit potential escaped fires.	How: Burn boss shall plan and coordinate will all appropriate agencies and directorates. CAB and contract aircraft will be secured to provide support during the operation Who: Burn Boss shall assure all coordination/planning is in place	M

10. OVERALL RESIDUAL RISK LEVEL *(All controls implemented)*:

☐ EXTREMELYHIGH ☐ HIGH ☒ MEDIUM ☐ LOW

11. OVERALL SUPERVISION PLAN AND RECOMMENDED COURSE OF ACTION

Burn Boss will provide an operational briefing before each shift. Briefing will clarify organization, responsibilities, communications, hazards, weather, expected fire behavior, aviation and medical plan. Firefighters used on burn assignments shall meet age, health, and physical requirements established for arduous firefighting duties. Positions will be filled using fully qualified persons or trainees meeting 310-1 requirements AND be assigned with a dedicated trainer.

The primary concern to firefighter safety is the UXO in the unit, however with coordination with EOD and the safety procedures outlined in Appendix D will help mitigate some of the risk associated with Prescribed Fire operations on the Range.

The potential for spotting or an escaped fire has been reduced by stacking heavy with aviation resources. Utilizing the heavy helicopters with the line production capabilities, as outlined in the Adequate Holding Forces worksheet in Appendix G, allow for a higher probability of success in extinguishing any spot fires or slop-overs.

Smoke impacts to motorist visibility are a concern, due to the proximity to public roadways. Refer to Elements 7, 9, 13, 17, and 19 for mitigation measures to reduce smoke impacts from burning. Wind direction, Daytime and Nighttime mixing heights and transport wind levels will be monitored closely before, during and after the burn to ensure public and firefighter safety.

Operations will normally be conducted with ARMY Fire staff in the critical overhead positions. Span of control will not exceed standard protocols, and the need for qualifications at the strike team or task force level in the regular burn organization is not anticipated.

12. APPROVAL OR DISAPPROVAL OF MISSION OR TASK		Approve	Disapprove
a. Name (Last, First, Middle Initial)	**b. Rank/Grade**	**c. Duty Title/Position**	**d. Signature of Approval Authority**
McGunegle, Steven B	COL	Garrison Commander	
e. Additional Guidance:			

Risk Assessment Matrix

		Probability *(expected frequency)*				
		Frequent: Continuous, regular, or inevitable occurrences	**Likely:** Several or numerous occurrences	**Occasional:** Sporadic or intermittent occurrences	**Seldom:** Infrequent occurrences	**Unlikely:** Possible occurrences but improbable
Severity *(expected consequence)*		**A**	**B**	**C**	**D**	**E**
Catastrophic: *Mission failure, unit readiness eliminated; death, unacceptable loss or damage*	**I**	**EH**	**EH**	**H**	**H**	**M**
Critical: *Significantly degraded unit readiness or mission capability; severe injury, illness, loss or damage*	**II**	**EH**	**H**	**H**	**M**	**L**
Moderate: *Somewhat degraded unit readiness or mission capability; minor injury, illness, loss, or damage*	**III**	**H**	**M**	**M**	**L**	**L**
Negligible: *Little or no impact to unit readiness or mission capability; minimal injury, loss, or damage*	**IV**	**M**	**L**	**L**	**L**	**L**

Legend*:* **EH** - Extremely High Risk **H** - High Risk **M** - Medium Risk **L** - Low Risk

13. RISK ASSESSMENT REVIEW *(Required when assessment applies to ongoing operations or activities)*

a. Date	b. Last Name	c. Rank/Grade	d. Duty Title/Position	e. Signature of Reviewer

14. FEEDBACK AND LESSONS LEARNED

15. ADDITIONAL COMMENTS OR REMARKS

Appendix E: Fire Behavior Modeling Documentation or Empirical Documentation

The following tables are derived from fire behavior modeling runs generated from the BEHAVE 5 fire behavior modeling program. The tables represent 3 modeling runs for each primary represented fuel model.

The hot, medium and cold output tables are based upon the variation of acceptable fuel moistures and wind speeds that are identified within the prescribed environmental parameters in Element 7 of this plan.

The HOT Fire Behavior Outputs are based upon the lowest acceptable herbaceous fuel moisture scenario and highest wind speeds for implementing the prescribed burn. The Burn Boss should evaluate the conditions on the ground and if these maximums are too much for safely implementing the burn.

The MEDIUM Outputs are based upon the preferred wind, temp, and fuel moisture scenario.

The COLD Outputs correspond to a higher herbaceous fuel moisture scenario and lowest wind speeds.

SUMMARY FIRE BEHAVIOR INPUTS AND RESULTS:

BehavePlus 5.0.5 (Build 307)

Schofield Prescribed Fire

Thu, Aug 18, 2022 at 15:37:31

Input Variables		Units	HOT Input Value(s)	MEDIUM Input Value(s)	COLD Input Value(s)	Colder Input Value(s)
Fuel/Vegetation, Surface/Understory						
Fuel Models SH3, TU3 and Gr2=custom model			Gr2, SH3, TU3	Gr2, SH3, TU3	Gr2, SH3, TU3	Gr2, SH3, TU3
Fuel Moisture						
	1-h Moisture	%	≥ 8	≥ 8	≥ 8	≥ 8
	10-h Moisture	%	≥ 10	≥ 10	≥ 10	≥ 10
	100-h Moisture	%	≥ 15	≥ 15	≥ 15	≥ 15
	Live Herbaceous Moisture	%	**70**	**90**	**120**	150
	Live Woody Moisture	%	100	100	100	100
Weather						
	Midflame Wind Speed (upslope)	mi/h	**6**	**4**	**3**	3
	Air Temperature	oF	80	80	80	80
	Fuel Shading from the Sun	%	5	5	5	5
Terrain						
	Slope Steepness	%	20	20	20	20
Fire						
	Elapsed Time	h	1	1	1	1

FIRE BEHAVIOR RESULTS

Results HOT (Herb Moist = 70 and MFW = 6 mph)

Fuel Model	ROS (max) ch/h	Flame Length ft	Spread Distance ch	Fire Area ac	Fire Perimeter ch	Firebrand Ignition %
GR2 Custom	30.5	12.7	30.5	30.3	72	43
TU3	27.3	7	27.3	25.7	66	43
SH3	4.2	2.3	4.2	0.6	10	43

Results MED (Herb Moist = 90 and MFW =4 mph)

Fuel Model	ROS (max) ch/h	Flame Length ft	Spread Distance ch	Fire Area ac	Fire Perimeter ch	Firebrand Ignition %
GR2 Custom	17.6	10.4	17.6	13.2	45	43
TU3	14.9	5.3	14.9	10	39	43
SH3	2.7	1.9	2.7	0.3	7	43

Results Cold (Herb Moist = 120 and MFW = 3 mph)

Fuel Model	ROS (max) ch/h	Flame Length ft	Spread Distance ch	Fire Area ac	Fire Perimeter ch	Firebrand Ignition %
GR2 Custom	11.2	9	11.2	6.1	30	43
TU3	9.1	4.1	9.1	4.3	25	43
SH3	2.1	1.7	2.1	0.2	6	43

Colder (Herb Moist = 150 and MFW = 3 mph)

Fuel Model	ROS (max) ch/h	Flame Length ft	Spread Distance ch	Fire Area ac	Fire Perimeter ch	Firebrand Ignition %
GR2 Custom	9.4	8.3	9.4	4.3	25	43
TU3	7.9	3.7	7.9	3.2	21	43
SH3	2.1	1.7	2.1	0.2	5.4	0.0

Custom Grass Model GR2 Fire Behavior Outputs

BehavePlus 5.0.5 (Build 307)

Schofield Prescribed Fire

Thu, Sep 14, 2023 at 13:17:47

Input Worksheet - Custom Grass Fuel Model

Inputs: SURFACE, SIZE, IGNITE

Input Variables		Units	Input Value(s)
Fuel/Vegetation, Surface/Understory			
	Fuel Model Type		D
	1-h Fuel Load	ton/ac	4
	10-h Fuel Load	ton/ac	3
	100-h Fuel Load	ton/ac	0
	Live Herbaceous Fuel Load	ton/ac	4
	Live Woody Fuel Load	ton/ac	0
	1-h SA/V	ft2/ft3	1200
	Live Herbaceous SA/V	ft2/ft3	1100
	Live Woody SA/V	ft2/ft3	1100
	Fuel Bed Depth	ft	2.7
	Dead Fuel Moisture of Extinction	%	40
	Dead Fuel Heat Content	Btu/lb	8000
	Live Fuel Heat Content	Btu/lb	8000
Fuel/Vegetation, Overstory			
	Canopy Cover	%	0
	Canopy Height	ft	0
	Crown Ratio	fraction	
Fuel Moisture			
	1-h Moisture	%	8
	10-h Moisture	%	10
	100-h Moisture	%	
	Live Herbaceous Moisture	%	70, 90, 120, 150, 180
	Live Woody Moisture	%	100
Weather			
	20-ft Wind Speed	mi/h	15,10,8
	Wind Direction (from north)	deg	60
	Air Temperature	oF	80
	Fuel Shading from the Sun	%	5
Terrain			
	Slope Steepness	%	20
	Aspect	deg	90
Fire			
	Elapsed Time	h	1
Notes			

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind and spread directions are degrees clockwise from north [SURFACE].
Wind direction is the direction from which the wind is blowing [SURFACE].

Results for: Surface Rate of Spread (maximum) (ch/h)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	30.5	20.4	16.5
90	26.3	17.6	14.3
120	20.7	13.8	11.2
150	17.3	11.6	9.4
180	15	10	8.1

Results for: Flame Length (ft)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	12.7	10.6	9.6
90	12.5	10.4	9.4
120	12	10	9
150	11	9.1	8.3
180	10.2	8.5	7.7

Results for: Direction of Maximum Spread (from north) (deg)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	241	242	243
90	241	242	243
120	241	242	243
150	241	242	243
180	241	242	243

Results for: Surface Spread Distance (ch)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	30.5	20.4	16.5
90	26.3	17.6	14.3
120	20.7	13.8	11.2
150	17.3	11.6	9.4
180	15	10	8.1

Results for: Midflame Wind Speed (mi/h)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	6.2	4.1	3.3
90	6.2	4.1	3.3
120	6.2	4.1	3.3
150	6.2	4.1	3.3
180	6.2	4.1	3.3

Results for: Wind Adjustment Factor ()

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	0.41	0.41	0.41
90	0.41	0.41	0.41
120	0.41	0.41	0.41
150	0.41	0.41	0.41
180	0.41	0.41	0.41

Results for: Effective Wind Speed Limit (mi/h)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	75.8	75.8	75.8
90	84.6	84.6	84.6
120	98.3	98.3	98.3
150	96.6	96.6	96.6
180	95.6	95.6	95.6

Results for: Live Fuel Moisture of Extinction (%)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	1278	1278	1278

90	737	737	737
120	376	376	376
150	376	376	376
180	376	376	376

Results for: Area (ac)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	30.3	17.7	13.3
90	22.6	13.2	9.9
120	13.9	8.1	6.1
150	9.8	5.7	4.3
180	7.3	4.3	3.2

Results for: Perimeter (ch)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	72	52	44
90	62	45	38
120	49	35	30
150	41	30	25
180	36	26	22

Results for: Forward Spread Distance (ch)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	30.5	20.4	16.5
90	26.3	17.6	14.3
120	20.7	13.8	11.2
150	17.3	11.6	9.4
180	15	10	8.1

Results for: Probability of Ignition from a Firebrand (%)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	43	43	43
90	43	43	43
120	43	43	43
150	43	43	43
180	43	43	43

BehavePlus 5.0.5 (Build 307)

Schofield Prescribed Fire

Thu, Sep 14, 2023 at 14:38:15

Input Worksheet – TU3 Fuel Model

Inputs: SURFACE, SIZE, IGNITE

Input Variables		Units	Input Value(s)
Fuel/Vegetation, Surface/Understory			
	Fuel Model Type		D
	1-h Fuel Load	ton/ac	1.1
	10-h Fuel Load	ton/ac	0.15
	100-h Fuel Load	ton/ac	0.25
	Live Herbaceous Fuel Load	ton/ac	0.65
	Live Woody Fuel Load	ton/ac	1.1
	1-h SA/V	ft2/ft3	1800
	Live Herbaceous SA/V	ft2/ft3	1600
	Live Woody SA/V	ft2/ft3	1400
	Fuel Bed Depth	ft	1.3
	Dead Fuel Moisture of Extinction	%	30
	Dead Fuel Heat Content	Btu/lb	8000
	Live Fuel Heat Content	Btu/lb	8000
Fuel/Vegetation, Overstory			
	Canopy Cover	%	0
	Canopy Height	ft	0
	Crown Ratio	fraction	
Fuel Moisture			
	1-h Moisture	%	8
	10-h Moisture	%	10
	100-h Moisture	%	15
	Live Herbaceous Moisture	%	70, 90, 120, 150, 180
	Live Woody Moisture	%	100
Weather			
	20-ft Wind Speed	mi/h	15,10,8
	Wind Direction (from north)	deg	60
	Air Temperature	oF	80
	Fuel Shading from the Sun	%	5
Terrain			
	Slope Steepness	%	20
	Aspect	deg	90
Fire			
	Elapsed Time	h	1
Notes			

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

Results for: Surface Rate of Spread (maximum) (ch/h)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	27.3	16.7	12.9
90	24.4	14.9	11.5
120	19.3	11.8	9.1
150	16.7	10.2	7.9
180	13.9	8.5	6.6

Results for: Flame Length (ft)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	7	5.6	5
90	6.6	5.3	4.7
120	5.7	4.6	4.1
150	5.2	4.2	3.7
180	4.5	3.6	3.2

Results for: Direction of Maximum Spread (from north) (deg)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	241	242	243
90	241	242	243
120	241	242	243
150	241	242	243
180	241	242	243

Results for: Surface Spread Distance (ch)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	27.3	16.7	12.9
90	24.4	14.9	11.5
120	19.3	11.8	9.1
150	16.7	10.2	7.9
180	13.9	8.5	6.6

Results for: Midflame Wind Speed (mi/h)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	5.7	3.8	3.1
90	5.7	3.8	3.1
120	5.7	3.8	3.1
150	5.7	3.8	3.1
180	5.7	3.8	3.1

Results for: Wind Adjustment Factor ()

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	0.38	0.38	0.38
90	0.38	0.38	0.38
120	0.38	0.38	0.38
150	0.38	0.38	0.38
180	0.38	0.38	0.38

Results for: Effective Wind Speed Limit (mi/h)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	33.7	33.7	33.7
90	32.9	32.9	32.9
120	30.6	30.6	30.6
150	28.7	28.7	28.7
180	25.6	25.6	25.6

Results for: Live Fuel Moisture of Extinction (%)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	279	279	279
90	224	224	224

120	158	158	158
150	158	158	158
180	158	158	158

Results for: Area (ac)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	25.7	12.5	8.5
90	20.6	10	6.8
120	12.9	6.2	4.3
150	9.7	4.7	3.2
180	6.7	3.2	2.2

Results for: Perimeter (ch)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	66	43	35
90	59	39	31
120	46	31	25
150	40	27	21
180	33	22	18

Results for: Forward Spread Distance (ch)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	27.3	16.7	12.9
90	24.4	14.9	11.5
120	19.3	11.8	9.1
150	16.7	10.2	7.9
180	13.9	8.5	6.6

Results for: Probability of Ignition from a Firebrand (%)

Live Herb Moisture	20-ft Wind Speed mi/h		
%	15	10	8
70	43	43	43
90	43	43	43
120	43	43	43
150	43	43	43
180	43	43	43

SH3/FM143 Fire Behavior Outputs

BehavePlus 5.0.5 (Build 307)

Schofield Prescribed Fire Outside Unit Scenario

Thu, Sep 14, 2023 at 14:10:32

Input Worksheet - SH3/FM 143 Fuel Model

Inputs: SURFACE, SIZE, IGNITE

Input Variables		Units	Input Value(s)
Fuel/Vegetation, Surface/Understory			
	Fuel Model		sh3
Fuel Moisture			
	1-h Moisture	%	8
	10-h Moisture	%	10
	100-h Moisture	%	18
	Live Herbaceous Moisture	%	70, 90, 120, 150, 180
	Live Woody Moisture	%	100
Weather			
	20-ft Wind Speed	mi/h	15,10,8
	Wind Adjustment Factor		0.4
	Wind Direction (from north)	deg	60
	Air Temperature	oF	80
	Fuel Shading from the Sun	%	5
Terrain			
	Slope Steepness	%	20
	Aspect	deg	110
Fire			
	Elapsed Time	h	1
Notes			

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

Wind direction is the direction from which the wind is blowing [SURFACE].

Results

20-ft Wind mi/h	ROS (max) ch/h	Flame Length ft	Direction Max ROS deg
15	4.2	2.3	242
10	2.7	1.9	244
8	2.1	1.7	245

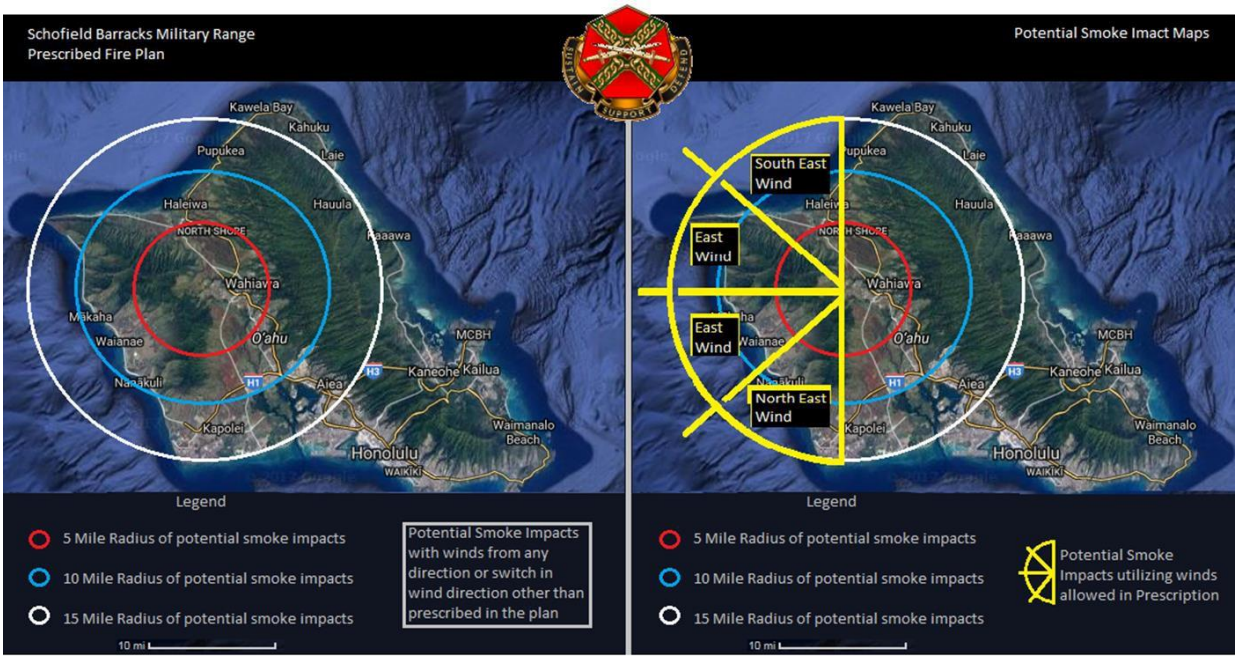
20-ft Wind mi/h	Spread Distance ch	Midflame Wind Speed mi/h	Wind Adj Factor	Effective Wind mi/h	Max Wind Exceeded	Fire Area ac	Fire Perimeter ch	Forward Distance ch	Firebrand Ignition %
15	4.2	6	0.4	6.2	No	0.6	10	4.2	43
10	2.7	4	0.4	4.2	No	0.3	7	2.7	43
8	2.1	3.2	0.4	3.4	No	0.2	6	2.1	43

Appendix F: Smoke Management Plan and Smoke Modeling Documentation

Fire is an essential ecological disturbance, providing many benefits to the environment in terms of wildlife, water and soil quality, and nutrient cycling. Prescribed fire can be a means of protecting communities and protecting air quality by mitigating the occurrence of large wildfires and reducing invasive species.

However, fire produces smoke which contains particulate matter (PM), ozone precursors, greenhouse gases, and other trace gases. A direct control cannot be put on a prescribed fire—unlike other air pollution sources such as a power plant smoke stack—rather a variety of environmental factors must be taken into account to manage both the prescribed fire itself and the smoke produced from the prescribed fire. Basic Smoke Management Practices (BSMPs) applied on prescribed fire can mitigate the impacts of smoke to public health, public safety and nuisance, and visibility.

The USDA Forest Service and Natural Resources Conservation Service have created a Technical Note that outlines a suite of BSMP options that a fire manager can utilize to reduce the impacts of smoke from prescribed fires (USDA Forest Service and Natural Resource Conservation Service, 2011). The publication *Smoke Management Guide for Prescribed and Wildland Fire,* PMS 420-2, provides more information on managing smoke and is available on the NWCG Web site at http://www.nwcg.gov/pms/pubs/pubs.htm.More information on smoke can be found in the National Interagency Fire Center Web site http://www.nifc.gov/smoke and the NWCG Smoke Committee page on The Wildland Fire Lessons Learned Center Web site at http://wildfirelessons.net/.



Appendix G: Adequate Holding Resources Worksheet

Project Name: SCHOFIELD BARRACKS MILITARY RANGE Prescribed Fire Plan Prepared By: Justin Turnbo
Fuel Models Inside Project Area: GR2, SH3,TU3 Fuel Models Outside Project Area: SH3

Characteristics	Output type	Modeling Predictions Inside Project Area				Outside Project Area	Unit of Measure
CRITICAL FIRE INPUTS	Fuel Model	GR2	TU3	SH3		SH3	
	1 Hr Fuel Moisture	8	8	8		8	%
	Live Herbaceous	70	70	70		70	%
	Live Woody Moisture	100	100	100		100	%
	Mid Flame Wind Speed	6	6	6		6	MPH
	Slope	20	20	20		20	%
KEY FIRE BEHAVIOR OUTPUTS	Rate of Spread (ROS)	30.5	27.3	4.2		4.2	ch/hr
	Fireline Intensity	356	780	10		356	BTU/ft/sec
	Flame Length	12.7	7	2.3		2.3	Feet
	Probability of Ignition	43	43	43		43	%
	Spotting Distance	0.2	0.3	0.1		0.2	Miles
	Scorch Height	45	92	0.9		45	Feet
FIRE SIZE	Projection Time	1.0	N/A	N/A		1.0	Hours
	Forward Spread	30.3				3.8	Chains
	Backward Spread	0.1				0.1	Chains
FIRE CONTAINMENT	Method Of Attack	Rear/ AIR	N/A	N/A		Rear/AIR	Head/Rear
	Contained Area	30.3				0.6	Acres
	Contained Perimeter	72				10	Chain
	Min. Line Building Rate Required*	72				10	Ch/hr
1. Choose greater total line building rate from inside and outside the project area		72					Ch/hr
2. Estimate potential number spot fires or slopovers at one time:						**1**	
3. TOTAL LINE BUILDING RATE NEEDED (multiply line 1 times line 2)						**72**	Ch/hr

* Fire modeling projections are for 1 hours. 70 Chains Per hour is the required speed that would catch the fire at 105 chains by 1.5 hours.

Production Rates: Ease of Access: POOR

On Site Organization	Total # Planned On Burn	Total # Dedicated to Prescribed Fire	Total # Available for Spot Fire or Slopover Control		Line Building Production Rates		Spot Fire or Slopover Line Building Capacity
Overhead	3	1 RXB2	2 (1 ICT5 overseeing suppression efforts, 1 FIRB building line)	X	8	Ch/hr	0
Firing Crew	2	1	1	X	4	Ch/hr	4
Holding Crew	2	0	2	X	4	Ch/hr	8
UTV w/ water	1	0	1	X	5	Ch/hr	5
Engine (Crew of 2)	3	2	1 engine and crew	X	8	Ch/hr	8
UH-60 Blackkhawk	2	2	2	X	12	Ch/hr	24
Bell 407	0	0	0	X	0	Ch/hr	0
1 CH-47 &1 UH-60	2	0	2	X	18	Ch/hr	36
3. TOTAL CAPACITY	16		12			Ch/hr	**85**
4. TOTAL LINE BUILDING RATE NEEDED (from table above)						Ch/hr	**72**
5. DETERMINATION OF ADEQUATE HOLDING RESOURCES (Line 4 minus Line 3)						Ch/hr	**-13**

***** Helicopters available on call must be able to contain a spot fire in Guinea grass on the north side of the range at any size before the fire spreads to theendangered species habitat on the west side of the range. In addition, helicopters must be able to containspot fires in Casaurina (ironwood) at 10 acres or less and in the non-native forest at as small a size as possible.

Ordinarily the rate of spread of spot fires in Guinea grass outside the firebreak road can be contained with a 660 gallon bucket helicopter (UH60 helicopter), responding within 10 minutes, and with a second helicopter (UH60) and delivering the first buckets of water within 10 minutes.

Additional line building capability is multiplied by the addition of (2 x Type 1) aircraft would be expected to be on scene within 30 minutes. This would equate to over 7,000 gallons of water every 5 to 10 minutes being applied to the fire area as most helicopters would be able to conduct at least 2 drops in 10 minutes. This is unprecedented for stopping spot fires. It is possible for a CH47 to put over 2 chains of fire out in Guinea grass per drop. Turnaround time from the dip site to the fire is less than 5 to 10 minutes. Most helicopters would be able to conduct more than 1 drop. Therefore more than 7,000 acres are estimated if all helicopters are working in tandem.

With a turnaround of 5 minutes from Dragon X-raydip pond a CH-47 could be assumed to produce 4 chains of fire stopping ability every 10 minutes or 24 chains per hour. We have reduced that to 18 chains per hour for variability of drops by pilots and wind conditions. (This estimate has been created by observing CH47's operating on wildfires on the ARMY ranges over the last 4 years).

Rate of spread of spot fires in non-native forest outside the firebreak road must be such that spot fires can be contained with a single 660 gallon bucket helicopter, responding within 6 minutes. This scenario assumes that the spot is reported at .1 acre size and that the helicopter has 18 chains/hour productivity. BEHAVE runs demonstrate that the three helicopters (1 x UH60 and 2 x Ch47) on site during the burn will catch an escape before the spot fire reaches 0.6 acres and a perimeter of 10 chains.

*In the event of a spot fire or slop over the resources must react within 10 minutes for this holding worksheet to be accurate. This is also formulated with the Maximum worst case scenario with max Winds and lowest fuel moistures allowed by prescription. Any changes towards the more preferable Medium range of the Prescription builds in margin for success and safety for the firefighters.

Appendix H**: Medical Plan**

MEDICAL PLAN	1. Incident Name **Schofield Prescribed Fire**	2. Date Prepared **27 NOV21**	3. Time Prepared **1000**	4. Operational Period **TBD**

5. Incident Medical Aid Station

Medical Aid Stations	Location	Paramedics Yes	Paramedics No
Medic 14 (ALS)	**Wheeler**	☒	
City and County of Honolulu	**Wahiawa General Hospital**	☒	
On site first aid	**On site**		☒

6. Transportation

A. Ambulance Services

Name	Address	Phone	Paramedics Yes	Paramedics No
City and County of Honolulu	**Wahiawa General Hospital**	**911**	☒	☐
Medic 14 (ALS)	**Wheeler Army Airfield**	**656-1376**	☒	☐
			☐	☐
			☐	☐

B. Incident Ambulances

Name	Location	Paramedics Yes	Paramedics No
Federal Fire	**Wheeler Army Aifield**	☒	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

7. Hospitals

Name	Address	Travel Time Air	Travel Time Grnd	Phone	Helipad Yes	Helipad No	Burn Center Yes	Burn Center No
Wahiawa General	**128 Lehau Street**	**10**	**15**	**621-8411**	☒	☐	☐	☒
Straub	**King Street, Honolulu**	**15**	**30**	**522-4000**	☒	☐	☒	☐
		☐	☐		☐	☐	☐	☐

8. Medical Emergency Procedures

No ambulance on site. Treatment on site at Command Post for minor injuries by firefighter/EMTs. Immediately call 911 for any serious or life-threatening emergencies and ambulatory transport. MEDEVAC is available. Medic 14 is available from Wheeler.

9. Prepared by	10. Reviewed by
Justin Turnbo, DES	

ICS 206

This plan will be completed for the IAP with the most current information.

Appendix I**: Test Fire Documentation**

Treatment Unit:_____ Date: _____

Test Fire Results		
	Yes	**No**
Are all prescription parameters favorable for implementing the burn?		
Narrative Comments:		
Is the observed fire behavior within prescription?		
Narrative Comments:		
Is the test fire successful, will it meet the plan objectives?		
Narrative Comments:		
If three items above are all "Yes", proceed with the prescribed fire.		

Signatures	
Burn Boss / Date / Time	Firing Boss / Date / Time

Appendix J**: Required Notification List**

A. Submit plan and Record of Environmental Consideration (REC)			
Name	**Organization**	**Phone**	**Email**
Ed Hewitt	NEPA Coordinator	656-5811	ed.j.hewitt.civ.@army.mil
B. Notify by email			
Name	**Organization**	**Phone**	**Email**
Ron Rico	Honolulu Fire		rrico@honolulu.gov
Gregg Moriguchi	Federal Fire Dept	471-3880 cell 306-6756	gregg.moriguchi@navy.mil
Neil Fujioka	Federal Fire Dept.	590-1544	neil.fujioka@navy.mil
Robert Hauff	State Protection	587-4174	robert.d.hauff@hawaii.gov
Ryan Peralta	DOFAW	292-5645 cell	ryan.k.peralta@hawaii.gov
Rick Black	US Army PAO	656-3154	rick.e.black.civ@army.mil
James Kwon	U.S. Fish & Wildlife		james_kwon@fws.gov
Dawn Bruns	U.S. Fish & Wildlife	927-4602	Dawn_Bruns@fws.gov
Jackie Alvarez-Martinez	DPW Environmental	656-3097	jacqueline.s.alvarez-martinez.civ@army.mil
Michelle Ogman	DPW Environmental	656-3316	michelle.r.ogman.civ@army.mil
Prisiclla Ramirez	DPW Environmental	656-3104	Priscilla.Ramirez@colostate.edu
Kapua Kawelo	DPW, Natural Resource Manager	656-9189	hilary.k.kawelo.civ@army.mil
Rhonda Suzuki	DPW Deputy Director	656-1289	rhonda.l.suzuki.civ@army.mil
Jessica Adinolfi	USAG-HI Oahu Biologist		
Laura Gilda	US Army Arch	655-9731	laura.l.gilda.civ@army.mil
Howard Killian	Army Range Control	655-1404	howard.j.killian2.civ@army.mil
Randal Au	Range Control	655-1490	randall.k.au.civ@army.mil
Ken Torre	Range Control	655-9509	kenneth.p.torre.civ@army.mil
State Forestry		808-587-4173	
Dept. of Health, Clean Air Branch		808-586-4200	
Regional Dispatch	FED FIRE	808-474-2222	

Appendix K**: Contact Information**

The information below is provided for reference only and does not represent the requirednotifications for burn days. Please see Appendix J for the list of required notifications.

TITLE	NAME	PHONE
DES Director	COL Charles Allen Green	808-787-1694
DES Deputy	Jim Tyler	808-656-6454
Provost NCOIC	MSG Brown	808-656-0525
Operations Officer	James Williams	808-656-6454
WFPM and Burn Boss	Justin Turnbo	808-653-0209
ARMY Fire Crew Supervisor	Jake Faber	808-223-5076

Works Cited:

Anderson, Hal E. “Aids to Determining Fuel Models for Estimating Fire Behavior." USDA Forest Service. General Technical Report INT-122. 1982.

Albini, Frank. “Estimating Wildfire Behavior and Effects.” USDA Forest Service. General Technical Report INT-30. 1976

Rothermel, Richard C. A Mathematical Model for Predicting Fire Spread in Wildland Fuels. USDA Forest Service. Research Paper INT-115. 1972.

Scott, Joe H. and Robert E. Burgan. "Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model." USDA Forest Service. General Technical Report RMRS-GTR-153. 2005