

APPENDIX C
FORT RICHARDSON ALTERNATE IMPACT
AREA SITING ANALYSIS

FORT RICHARDSON ALTERNATE IMPACT AREA SITING ANALYSIS

Prepared by:

**US Army Garrison Fort Wainwright Directorate of Plans,
Training, Mobilization, and Security
Installation Range Office - Safety
Integrated Training Area Management**

17 December 2009

FORT RICHARDSON ALTERNATE IMPACT AREA SITING ANALYSIS

SUMMARY

US Army Garrison Fort Richardson (USAG FRA) is preparing an Environmental Impact Statement (EIS) to analyze resumption of year-round indirect live fire weapons training at Fort Richardson. The National Environmental Policy Act (NEPA) and its implementing regulations require USAG FRA to consider a full range of reasonable alternatives when deciding how to implement the proposed action. During the public scoping process, USAG FRA was asked to consider the possibility of maintaining current restrictions on firing at the Eagle River Flats (ERF) Impact Area during the summer months, and opening a new impact area somewhere else on Fort Richardson. In response to these scoping comments, and consistent with the general NEPA requirement to analyze all reasonable alternatives for implementing a proposed action, USAG FRA began to analyze whether there exists on Fort Richardson a feasible alternative site for an impact area capable of supporting year-round indirect live-fire training. The Installation Range Office (IRO) initiated this analysis by developing a template which represents the minimum spatial requirements of a permanent impact area. With these requirements in mind, Range personnel identified all potential areas on Fort Richardson capable of supporting these minimum spatial requirements. These potential sites, ten in total, represent a reasonable consideration of potential locations on post without duplication. The analysis then assesses each potential site's ability to meet several additional, mandatory criteria for a permanent impact area. These mandatory criteria reflect essential regulatory and safety-related considerations. Adjustments to site configuration were made, where practicable, to promote each potential site's consistency with these criteria. After full analysis of all ten sites, it was determined that only one area of Fort Richardson could potentially support a new permanent impact area.

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Purpose.....	1
1.2 Current Indirect Live-fire Training Capability at Fort Richardson	2
1.2.1 Current Seasonal Use.....	2
1.2.2 Size.....	2
1.2.3 Firing Points.....	2
1.2.4 Impact Area.....	4
1.2.5 Surface Danger Zones.....	4
2. ALTERNATIVE IMPACT AREA ANALYSIS METHODOLOGY	4
2.1 Required Components of Potential Alternative Impact Area	4
2.1.1 Firing Points.....	5
2.1.2 Impact Area.....	5
2.1.3 Distance from Firing Points to Target Area.....	6
2.1.4 Surface Danger Zones.....	6
2.1.5 Artillery and Mortar Range Template.....	7
2.2 Application of Artillery and Mortar Range Template	8
2.3 Results of Applying Artillery and Mortar Range Template	8
3.0 MANDATORY (GO / NO GO) CRITERIA	9
3.1 Introduction.....	9
3.2 Conflict with Hardened Facilities	10
3.3 Conflict with Public Transportation Routes	10
3.4 Excessive Noise	11
3.5 Limitations associated with SDZs	13
4.0 SITE EVALUATION	14
4.1 Site Evaluation Process.....	14
4.2 Individual Site Evaluation Results.....	14
4.2.1 Potential Site 1	15
4.2.2 Potential Site 2	17
4.2.3 Potential Site 3	21
4.2.4 Potential Site 4	23
4.2.5 Potential Site 5	25
4.2.6 Potential Site 6	28
4.2.7 Potential Site 7	30
4.2.8 Potential Site 8	32
4.2.9 Potential Site 9	35
4.2.10 Potential Site 10	37
5.0 CONCLUSION.....	38
6.0 REFERENCES	39

FORT RICHARDSON IMPACT AREA FEASIBILITY ANALYSIS

1. INTRODUCTION

1.1 Purpose

The purpose of this document is to analyze whether an alternate permanent impact area could be constructed at another location at Fort Richardson. In recent years, seasonal limitations have restricted training capabilities at Fort Richardson's only permanent impact area, thus negatively impacting the ability of U.S. Army Alaska (USARAK) ability to meet mission requirements. USARAK and USAG Fort Richardson have commissioned an EIS to examine the resumption of year-round live-fire training at Fort Richardson. The Purpose and Need of this EIS may be distilled into the following objectives:

- Maximize the ability to train units to a common standard, including use of a full array of indirect- and direct-fire weapons and munitions at Fort Richardson.
- Maximize year-round opportunities for live-fire weapons training at Fort Richardson to ensure that Soldiers can train prior to deployments that may occur at any time of the year.
- Ensure long-term, realistic training at Fort Richardson that will provide Soldiers the opportunities to practice their skills in combat-like conditions.
- Improve Soldier quality of life and Family stability by minimizing the need for travel to other installations for small-unit training (company and below).
- Minimize overall training costs.
- Avoid land use conflicts.
- Ensure compliance with applicable environmental laws, regulations, and executive orders.

Training to a common standard requires that procedures used by Soldiers and units to operate, maintain, and fight with major weapons and equipment systems are performed in the same manner and at the same basic level of proficiency throughout the Army. This concept is designed to reduce the effects of personnel turnover and ensure that modular military organizations can operate effectively within any assigned formation. The indirect live-fire weapons systems assigned to units at Fort Richardson are the 60-mm mortar, 81-mm mortar, 105-mm Howitzer, and 120-mm mortar.

The creation of a new permanent impact area on an alternate location at Fort Richardson was suggested during the EIS scoping process as a reasonable alternative for accomplishing the objectives listed above. This document evaluates the viability of establishing an alternative permanent impact area at Fort Richardson.

1.2 Current Indirect Live-Fire Training Capability at Fort Richardson

1.2.1 Current Seasonal Use

ERF Impact Area supported heavy year-round unrestricted use until 1990 when U.S. Army Alaska (USARAK) voluntarily implemented a temporary firing suspension due to the discovery of a high rate of mortality in dabbling waterfowl. The temporary suspension of firing at ERF Impact Area did not eliminate or reduce waterfowl mortality and the Army sought to resume firing at ERF Impact Area. During 1991, the Army conducted an Environmental Assessment (EA) to determine environmental impacts related to resuming firing at ERF. This EA considered four alternatives for resuming firing at ERF and the Army ultimately selected “The Winter Firing Only” alternative in a Finding of No Significant Impact. Currently, USARAK may fire artillery and mortars at ERF only during the period from approximately 1 November through 31 March when ice thicknesses are sufficient to protect underlying sediments from disturbance.

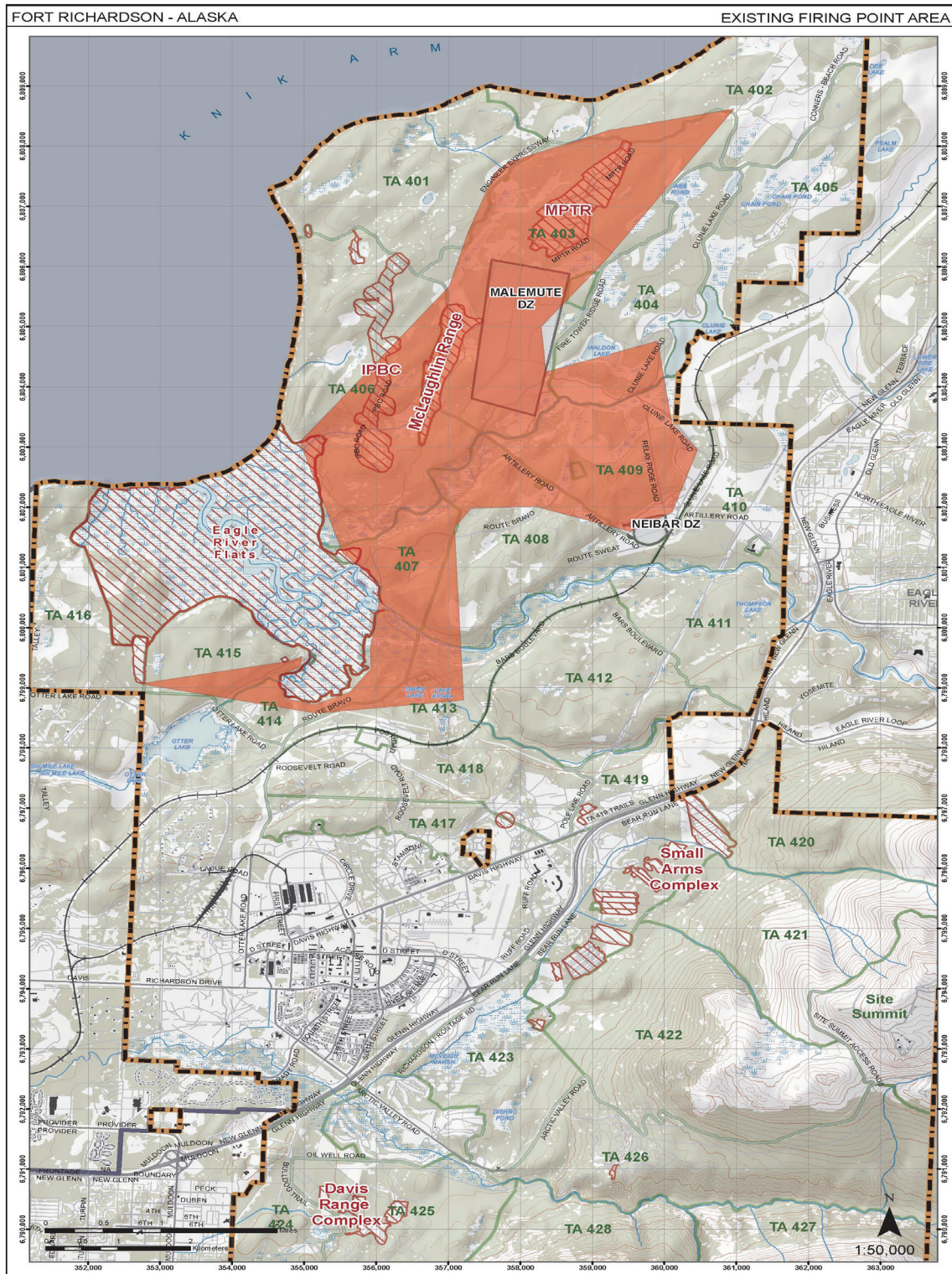
1.2.2 Size

ERF Impact Area is a 2,483 acre impact area at Fort Richardson used for both small arms and potentially dud-producing munitions. ERF Impact Area encompasses a large tidal salt marsh known as Eagle River Flats which is located at the mouth of Eagle River. ERF Impact Area also encompasses the steep bluffs that surround the Flats as well as some adjacent some upland terrain.

1.2.3 Firing Points

There are currently 9 mortar firing points and 17 artillery firing points that are used for indirect live-fire training at ERF Impact Area with 60-mm, 81-mm, and 120-mm mortars, as well as the 105-mm Howitzer artillery system. These firing points have been established at a variety of distances to the impact area to support tactical execution of the primary mission of indirect fire systems, in accordance with current doctrinal practices. As depicted in Figure 1.1, all of the firing points used to support indirect live-fire training at ERF Impact Area are located on the northern portion of Fort Richardson.

FIGURE 1.2.4 Existing Firing Points Available for Training at ERF Impact Area



1.2.4 Impact Area

Simply defined, an impact area is a location where targets are emplaced for weapons system engagement. Access to impact areas is heavily restricted due to safety concerns associated with the potential for unexploded ordnance (UXO). Within the perimeter of the impact area is contained a smaller area which contains the targets to be engaged from a specific firing point. This area is known as the target area. The size of the target area within the impact area is based on the safety distances for the effects of each type of munitions used in training. To support the full range of tactical operations, the target area (and by extension, the impact area) must be large enough to accommodate the variety of target sets required to support the full range of tactical operations. This variety of target sets must represent static or moving targets, and must be located in a single point or positioned in a variety of arrays. Currently at ERF Impact Area, there exists sufficient space to facilitate emplacement of the variety of target sets necessary to meet mission requirements for the full range of indirect fire systems.

1.2.5 Surface Danger Zones

A surface danger zone (SDZ) is defined as the ground and airspace designated within the training complex (to include associated safety areas) for vertical and lateral containment of projectiles, fragments, debris, and components resulting from the firing of weapons systems. (DA Pam 385-63, Glossary). SDZs are munitions and weapons systems-specific; are developed to ensure personnel safety during training exercises; and are calculated so as to contain all the effects of a given weapon and munitions. Specifically, the probability of hazardous fragments leaving the SDZ may not exceed 1:1,000,000. The SDZ essentially delineates a safety boundary which surrounds the firing point, the target area, and all points in between. Applicable regulations require SDZs to remain within installation boundaries (Paragraph 1-5b, DA Pam 385-63). The SDZs associated with the target arrays and firing points described above for ERF Impact Area meet all regulatory requirements.

2. ALTERNATIVE IMPACT AREA ANALYSIS METHODOLOGY

2.1 Template for Potential Alternative Impact Area

This subsection describes the basic necessary components of an impact area and associated infrastructure, as well as the spatial requirements posed by these basic necessary components and their relationships to each other. By consolidating these essential spatial requirements, this subsection presents the basic layout and minimum space required to support a new impact area.

2.1.1 Firing Points

A firing point is the area from which a weapons system engages its target. Each impact area requires an adequate number of minimally-sized firing points placed at sufficient distance from the each other (and as will be explained later, the impact area). Firing points must be of sufficient size to support the particular weapons system used. For artillery training with the 105-mm Howitzer, which require an area slightly larger than those required by mortar systems, an area of 200m by 200m is required to ensure unit safety during the exercise.

Execution of essential training also requires an adequate number of firing points, located at sufficient distances from each other, from which to engage the targets contained within an impact area. The number of firing points required for execution of a training exercise is based on the number of firing units participating in the exercise. Fort Richardson currently has 30 firing units with two batteries of artillery (105mm howitzer) that can train as individual platoons (4 firing units); Infantry Company Mortars (60mm) 14 sections, Infantry Battalion Mortars (81mm) 8 sections, and Cavalry Squadron Mortars (120mm) 4 sections. Training exercises executed by units stationed at Fort Richardson require up to ten separate and distinct firing points. The firing points supporting these units must be located, for reasons of tactical dispersion and survivability on the battlefield, at a distance of at least 500 m from each other. Units participating in these exercises must also be able to move from firing point to firing point throughout the execution of tactical operations. It should also be noted overhead firing with mortar systems is prohibited. In other words, units may not fire mortars through the airspace above a friendly unit.

Factoring all these requirements, IRO experts have concluded that a 3 km by 4 km area is needed to provide sufficient space to meet the live-fire weapons training requirement. This space is necessary to support the multiple training scenarios that ensure that units achieve standard proficiency.

2.1.2 Impact Area

An impact area is simply a designated area used for training with live munitions that includes one or more target areas and their corresponding safety buffer zones. A dud-producing impact area is a site where live-fire munitions such as mortars or howitzers are used that might result in UXO remaining at the impact site. UXO are munitions weapons (bullets, mortars, grenades, etc.) that did not explode when they were employed and still pose a risk of detonation.

An impact area must be of sufficient size in order to fit in the targets and target arrays required to support the Mission Essential Task List (METL) tasks of the units. As explained in Section 1.2.4, to support the full range of tactical operations, the target area (and by extension, the impact area) must be large enough to accommodate the variety of target sets required to support the full range of tactical operations. To adequately simulate battlefield conditions, this variety of target sets must include static and moving targets, as well as targets located in a single point and those positioned in arrays. These targets must be dispersed through the target area so as to present discrete targets for weapons training. Units must be

capable of engage from a fixed point, and in succession, a number of targets located at different locations within the target area. A variety of targets and target arrays is also necessary for units to walk their weapons system through different portions of the impact area. Based on the above requirements and the experience of IRO experts, it is concluded that an area of 2.2 km by 2.2 km is the minimum size necessary to support required training.

2.1.3 Distance from Firing Points to Impact Area

Indirect-fire weapons systems require firing points located at sufficient distance from the impact area. The relevant weapons system requiring the furthest distance from firing point to impact area is the 105mm Howitzer, a weapon capable of effectively engaging targets at distances up to 11km. Significantly, consistent firing of any weapon at its minimum or its maximum range poses detrimental effects to the function of the weapon, a concept also commonly seen in other mechanical devices. This analysis therefore does not require that a potential impact area be accompanied by firing points 11k m distant. Instead, this analysis focuses on the optimum distance of the 105-mm Howitzer, which is approximately half the distance of its maximum range, specifically 5 km. This distance is consistent with the operational parameters of how this weapons system would be tactically deployed in combat. It should be noted that the optimum range of the 105-mm Howitzer exceeds that of any other indirect live-fire weapons system used by Fort Richardson units. In other words, the minimum distance from impact area to firing point required for full execution of training with each mortar system considered here is less than 5 km. Thus, mortar systems do not require an additional increase in the minimum distance from impact area to firing points.

The required distance from impact area to firing points, based on the operation requirements of the 105-mm Howitzer as represented by the optimum range of that weapon, is therefore 5 km as measured from the midpoint of the firing box to the midpoint of the impact area box. For the reasons stated above, this minimum relative distance has been determined based on an analysis of the doctrinal employment of the weapon system to be an essential component of an impact area and is therefore incorporated into the Artillery and Mortar Range Template.

2.1.4 Surface Danger Zones

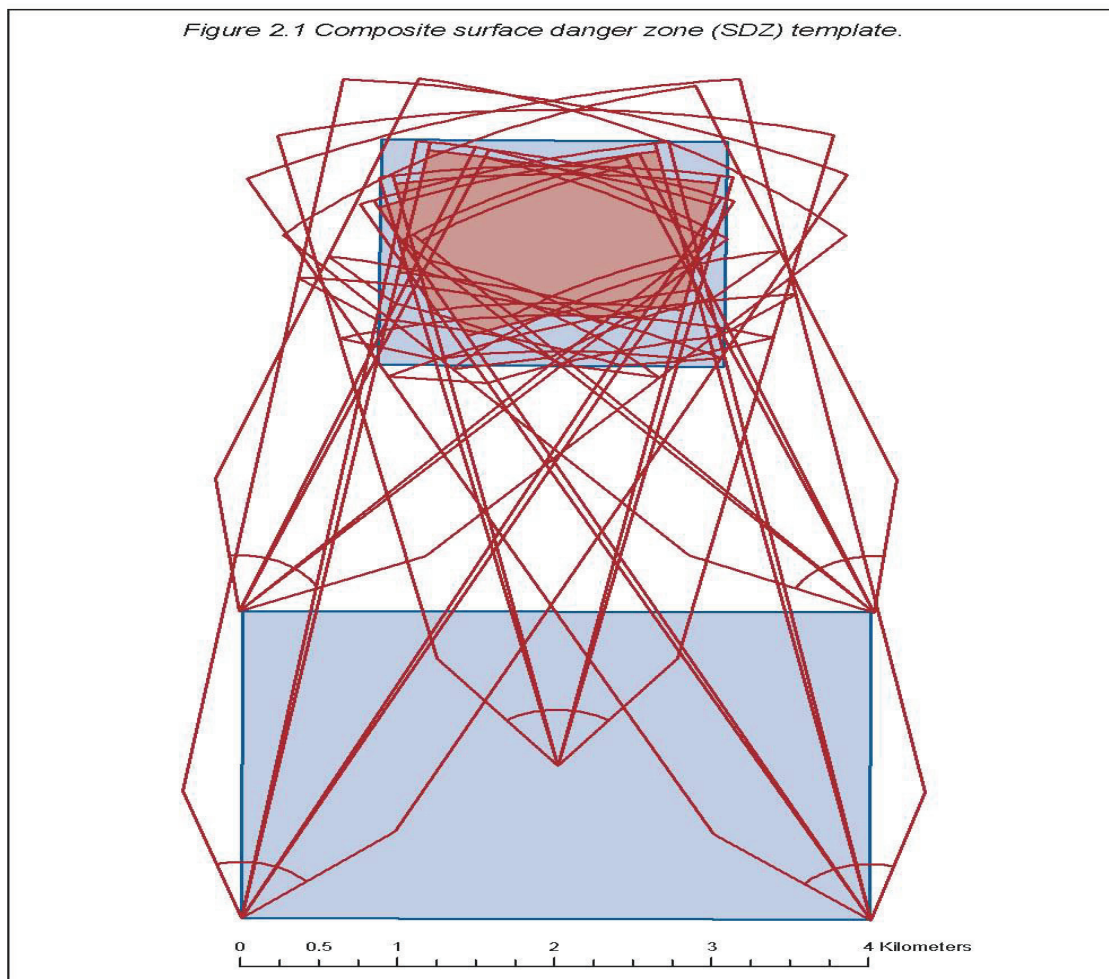
As introduced in Section 1.2.5, a surface danger zone (SDZ) is defined as the ground and airspace designated within the training complex (to include associated safety areas) for vertical and lateral containment of projectiles, fragments, debris, and components resulting from firing of weapons systems. (DA Pam 385-63, Glossary). SDZs are munitions specific and are developed to ensure personnel safety during training exercises and are calculated so as to contain all the effects of a given weapon. Specifically, the probability of hazardous fragments leaving the SDZ may not exceed 1:1,000,000. The SDZ essentially delineates a safety boundary which surrounds the firing point, the target area, and all points in between. Applicable regulations require SDZs for indirect fire systems to remain within installation boundaries (Paragraph 1-5b, DA Pam 385-63). Accordingly, SDZs may not overlay private property, including the Alaska Railroad corridor which bisects the northern portion of Fort Richardson.

Prior subsections calculated the minimum size for an impact area, assuming the ability to engage the maximum number of targets within the impact area from an adequate selection and configuration of firing points. To accurately represent the SDZs that would arise from firing at all available targets within the impact area, this analysis calculated the surface danger zones stemming from firing from all four corners of the previously defined firing point box, plus one point located at the center of the firing point box. Due consideration of the minimum requirements of impact areas and their firing points therefore requires incorporation into the Artillery and Mortar Range Template of these five SDZs.

2.1.5 Artillery and Mortar Range Template

The Artillery and Mortar Range Template depicted in the figure below represents the operational area needed for the firing point box (3 km by 4km), the impact area (2.2 km by 2.2 km), and the minimum distance between center points of the firing point and impact area boxes (5 km). The end result is an irregular rectangle of approximately 8 km by 4 km.

FIGURE 2.1. Artillery and Mortar Range Template



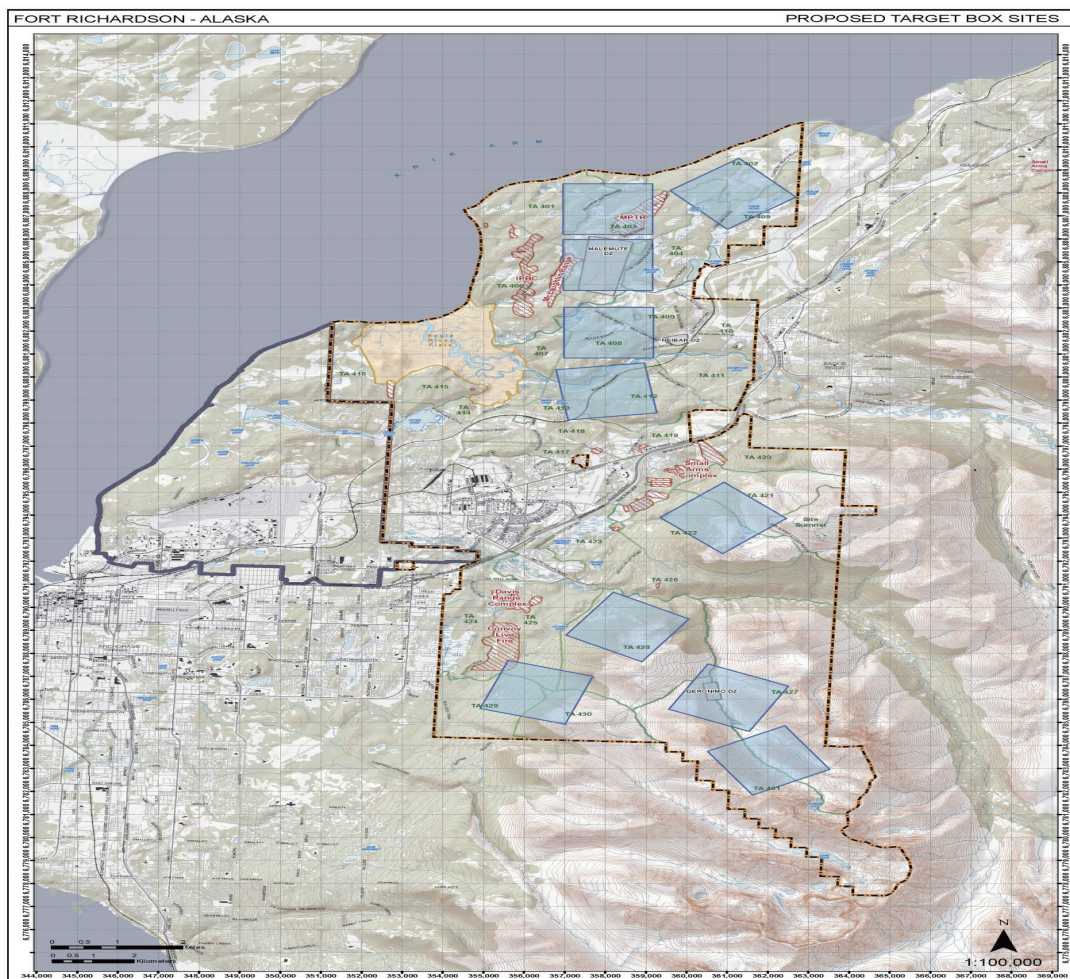
2.2 Application of Artillery and Mortar Range Template

The entirety of Fort Richardson was examined to ascertain all locations capable of supporting both the impact area box and the firing point box. A full range of locations was considered, subject to certain necessary limitations. Specifically, locations within the installations' cantonment area were not considered since this land is not available for live-fire training. Also, this identification process considers only discrete sites that do not overlay other potential sites, thus avoiding duplication of analysis. In order for a site to be considered for analysis, the impact area box and the firing point area box (positioned as depicted in the Template) must be contained within the installation boundaries.

2.3 Results of Applying Artillery and Mortar Range Template

Based on an initial application of the Template a total of ten discrete sites on Fort Richardson meet the above parameters. These ten sites are shown in Figure 2-2.

Figure 2.2 Potential Sites for Evaluation



3.0 MANDATORY (GO / NO GO) CRITERIA

3.1 Introduction

In addition to mere size, there are other requirements that a potential site location absolutely must meet in order to be a feasible location for an impact area. These mandatory (or “go/no go”) criteria are directly rooted in regulatory requirements, doctrinal training methods, and /or other Army publications that govern training and safety. Each go/no go criterion is listed below and accompanied by brief descriptions of the requirement necessitating each criterion, applicable definitions, the method of analysis, and the basic method for evaluating the criterion. The initial application of these criteria to each potential site will be followed, if necessary, with certain site-specific adjustments in an attempt to achieve full compliance with applicable criteria. These adjustments may include re-shaping (without reduction of the total area) of firing point boxes and recalculation of associated SDZs. Because the impact area box represents the minimum essential area required for the target array no action will be

considered that would reduce the usable area or configuration of the impact area box or the target box contained therein.

3.2 Conflict with Hardened Facilities

Definitions. A hardened facility is any developed structure or area required to support mission training requirements, operational needs, installation support, or utilities systems. This includes but is not limited to automated ranges, training complexes, administrative buildings, dwellings, improved roads, landing strips, and mission support facilities.

Criteria Requirement. It is imperative to examine any negative impact that locating the Artillery and Mortar Range Template at a particular site would have on existing hardened facilities. In some instances, firing points may be incorporated into existing hardened facilities with no direct impact to the hardened facility. However, impact areas are generally incompatible with hardened facilities. Where the siting of an impact area would directly impact an existing hardened facility, the requirement is to examine the practicality of moving or replicating the hardened facility at another location. The end state must be that no current training capability be eliminated or degraded as the result of the creation of the new impact area.

Analysis. The first step in this process is to apply the Artillery and Mortar Range Template to each identified potential site. The next step is to ascertain if the firing point box or impact area box of this Template encompasses any areas featuring a hardened facility. Where there is a conflict, this analysis assesses the practicability of relocating the affected hardened facility within the installation boundaries. If re-location of the hardened facility is not practicable, and the conflict is with the firing point box, the analysis will consider the practicability of reconfiguring the firing point box and/or incorporating firing points amongst those hardened facilities deemed compatible.

Evaluation. An option is not feasible if the Artillery and Mortar Range Template conflicts with any hardened facilities, there exist no practical means of relocating or replicating the affected hardened facilities on the installation.

3.3 Conflict with Public Transportation Routes

Definitions. Public transportation routes are the roads that provide unrestricted public access, as well as the railroad right-of-way. On Fort Richardson the only routes outside of the cantonment area that qualify as public transportation routes are Arctic Valley Road and the Alaska Railroad right-of-way. It is not within the Army's authority or otherwise practicable to relocate either of these routes. All other roads on the installation are controlled by the installation and can be closed for training purposes.

Criteria Requirement. USARAK 350-2 and regulatory guidance (DA Pam 385-63, paragraph 11-4k(4); DA Pam 385-63, paragraph 10-1a) prohibit indirect firing over public transportation routes as defined above.

Analysis. The first step in this process is to apply the Artillery and Mortar Range Template to each identified potential site. The next step is to ascertain if this Template encompasses a public transportation routes. Where such conflict does exist, this analysis then assesses the practicality of adjusting the configuration (but not the size) of the firing point box so as to eliminate the conflict.

Evaluation. A site is not considered feasible if it would necessitate firing over public transportation routes or other public use facilities.

3.4 Hazardous Noise

Definitions. Hazardous noise is determined by applicable standards outlined below:

Municipality of Anchorage hazardous noise emissions standards. (AMC 15.70.100.) Hazardous noise limits are based upon the number of impulse noise events at a particular amplitude over a particular 24-hour period. Under the Municipal Code, any impulse event causing noise 145 dB or greater is considered hazardous; at 135 dB, anything over ten impulse noise events is considered hazardous; and at 125 dB, anything in excess of 100 impulse events is considered hazardous.

TABLE 3-1. Hazardous Noise Standards from Anchorage Municipal Code

TABLE 5. HAZARDOUS IMPULSIVE NOISE EMISSION LEVELS

Sound Level Limit dB(A)	Number of Impulses per 24-hour Period
145	1
135	10
125	100

Army standards pertaining to noise and noise complaints (AR 200-1 Chap 14)
Army noise standards are predicated on the relative potential for noise complaints. These standards are presented in the Table below.

TABLE 3-2 Noise Complaint Levels from AR 200-1 Chap 14

Table 14-2 Risk of Noise Complaints by Level of Noise	
Risk of Noise complaints	Large caliber weapons noise limits (dB) PK 15(met)
Low	< 115
Medium	115 - 130
High	130 - 140
Risk of physiological damage to unprotected human ears and structural damage claims	> 140

Legend for Table 14-2:
dB = decibel
PK 15(met) = Single event peak level exceeded by 15 percent of events

Notes:

¹ Although local conditions regarding the need for housing may require noise-sensitive land uses in Noise Zone II, on or off post, this type of land use is strongly discouraged. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the noise-sensitive land use would not be met if development were prohibited in Noise Zone II.

² Where the community determines that these uses must be allowed, measures to achieve an outdoor to indoor noise level reduction (NLR) of at least 25 dB to 30 dB in Noise Zone II, from small arms and aviation noise, should be incorporated into building codes and be in individual approvals. The NLR for communities subject to large caliber weapons and weapons system noise is lacking scientific studies to accomplish the recommended NLR. For this reason it is strongly discouraged that noise-sensitive land uses be allowed in Noise Zone II from large caliber weapons.

³ Normal permanent construction can be expected to provide a NLR of 20 dB, for aircraft and small arms, thus the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation, upgraded Sound Transmission Class (STC) ratings in windows and doors and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

⁴ NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, and design and use of berms and barriers, can help mitigate outdoor noise exposure NLR particularly from ground level aircraft sources. Barriers are generally not effective in noise reduction for large arms such as artillery and armor, large explosions, or from high-level aircraft sources.

Criteria Requirement.

The Army's Environmental Noise Management Program (ENMP) is described in Army regulations (AR 200-1, Chapter 14), and implements federal law concerning environmental noise generated by Army activities, including aircraft operations, range firing, and weapons testing. The goals of the program are to protect the health and welfare of people on and off installations affected by Army-produced noise and to reduce community annoyance from environmental noise. The program seeks to achieve compliance with applicable noise regulations in a manner consistent with an installation's military mission.

The ENMP requires installations to implement environmental noise policies to identify and control the effects of noise. Among these policies is the requirement to predict noise levels for long-range planning, including preparation of noise contour maps. The maps delineate up to three different noise zones, which are based on the expected percentage of the population that would be highly annoyed by environmental noise. AR 200-1, paragraph 14-4a(9) states that single event noise limits as depicted in Table 4.1.9-1 below correspond to areas of low to high risk of noise complaints from large caliber weapons and weapons systems. These should be used to supplement the noise zones defined in table 14-1 for land use decisions. Noise sensitive land uses are discouraged in areas where PK 15(met) is between 115 and 130 dB; medium risk of complaints. Noise sensitive land uses are strongly discouraged in areas equal to or greater than PK 15(met) = 130 dB; high risk of noise complaints. For infrequent noise events, installations should determine if land use compatibility within these areas is

necessary for mission protection. In the case of infrequent noise events, such as the detonation of explosives, the installation should communicate with the public.

Consistent with Municipal code and the Army ENMP, a new impact area will not be located on Fort Richardson where training would cause any noise impact on non-Army property of 130 dB or above. IRO experts deem this restriction necessary to ensure that training events, which frequently entail more than ten impulsive noise events from a given firing point, do not cause hazardous noise to enter non-Army property.

Analysis. The first step in this process is to apply the Artillery and Mortar Range Template to each identified potential site. The next step is to ascertain if the position of the Template at this location would cause noise 130 dB or greater to extend onto non-Army property. Consistent with standard range planning practices, this analysis employs the Range Manager's Tool Kit for modeling noise contours. Where such conflict does exist, this analysis then assesses the practicality of adjusting the configuration (but not the size) of the firing point box so as to eliminate the impermissible noise effects.

Evaluation. A site is not considered feasible if the proposed location of the Artillery and Mortar Range Template causes noise 130 dB or greater to extend onto non-Army property, and it is not possible to resolve the conflict by modifying the configuration of the firing point box.

3.5 Limitations associated with SDZs

Definitions. The definitional parameters of a surface danger zone are explained in section 1.2.5 and 2.1.4.

Criteria Requirement. The SDZ for any weapon system cannot extend beyond the installation boundary.

Analysis. The first step in this process is to apply the Artillery and Mortar Range Template to each identified potential site. The next step is to ascertain if the position of the Template at this location would cause any portion of the SDZ to leave the installation boundary or overlay any private property. Where such conflict does exist, this analysis then assesses the practicality of adjusting the configuration (but not the size) of the firing point box, and thereby adjusting the resulting SDZ, in an attempt to eliminate the conflict.

Evaluation. A site is not considered feasible if the proposed location of the Artillery and Mortar Range Template causes any portion of the SDZ to leave the installation boundary or overlay private property, and it is not possible to resolve the conflict by modifying the configuration of the firing point box.

4.0 SITE EVALUATION

4.1 Site Evaluation Process.

Potential sites are evaluated through the following process:

- 1) Apply Artillery and Mortar Range Template to potential sites
- 2) Assess potential sites' ability to meet mandatory criteria
- 3) Where mandatory criteria are not met, attempt to resolve conflicts through practicable reconfiguration
- 4) Re-assess potential sites' ability to meet mandatory criteria in light of practicable reconfiguration

4.2 Individual Site Evaluation Results. The following sections evaluate each potential site based on the evaluation criterion listed above. Each section contains an illustration showing the application of the Artillery and Mortar Range Template to the potential site. The illustration will also highlight other relevant considerations such as hardened facilities, public transportation routes, and noise contours. Where applicable, an additional figure will illustrate attempts to resolve conflicts. A table summarizing of the results of the site evaluation analysis is provided below.

TABLE 4-1
INDIVIDUAL SITE EVALUATION RESULTS

POTENTIAL SITE	1	2	3	4	5	6	7	8	9	10
CRITERIA 1 - CONFLICT WITH HARDENED FACILITIES	GO	NO GO	NO GO	NO GO	GO	NO GO	NO GO	NO GO	GO	GO
CRITERIA 2 - CONFLICT WITH PUBLIC TRANSPORTATION ROUTES	GO	GO	NO GO	GO	NO GO	NO GO	NO GO	NO GO	GO	GO
CRITERIA 3 - HAZARDOUS NOISE	NO GO	NO GO	GO	GO	NO GO	GO	GO	GO	GO	NO GO
CRITERIA 4 - LIMITATIONS ASSOCIATED WITH SDZs	NO GO	NO GO	GO	NO GO	O GO	GO	GO	GO	GO	NO GO

4.2.1 Potential Site 1

Criteria 1: Potential site 1 is a GO for this criterion. The firing point box of the template overlays the following facilities; Malemute Drop Zone, McGlaughlin Range, and the Infantry Platoon Battle Course. Although relocation of these facilities is not practicable, firing points currently exist in conjunction with these facilities, and sufficient firing points can be implemented to support the proposed impact area. As a result the conflicting facilities do not require relocation. There is no conflict between the impact area box and any hardened facilities.

Criteria 2: Potential site 1 is a GO for this criterion. This potential site does not conflict with any public transportation routes.

Criteria 3: Potential site 1 is a NO GO for this criterion. The noise contour overlay associated with the impact area box indicates that the noise levels beyond the boundary would exceed allowable limits (130 db). There are no adjustments that can be made to the firing point box that would preclude this condition.

Criteria 4: Potential site 1 is a NO GO for this criterion. Portions of the Surface Danger Zone, in conjunction with the impact area box, extend beyond the installation boundary. There are no adjustments that can be made to the firing point box that would preclude this condition.

Figure 4-1.1

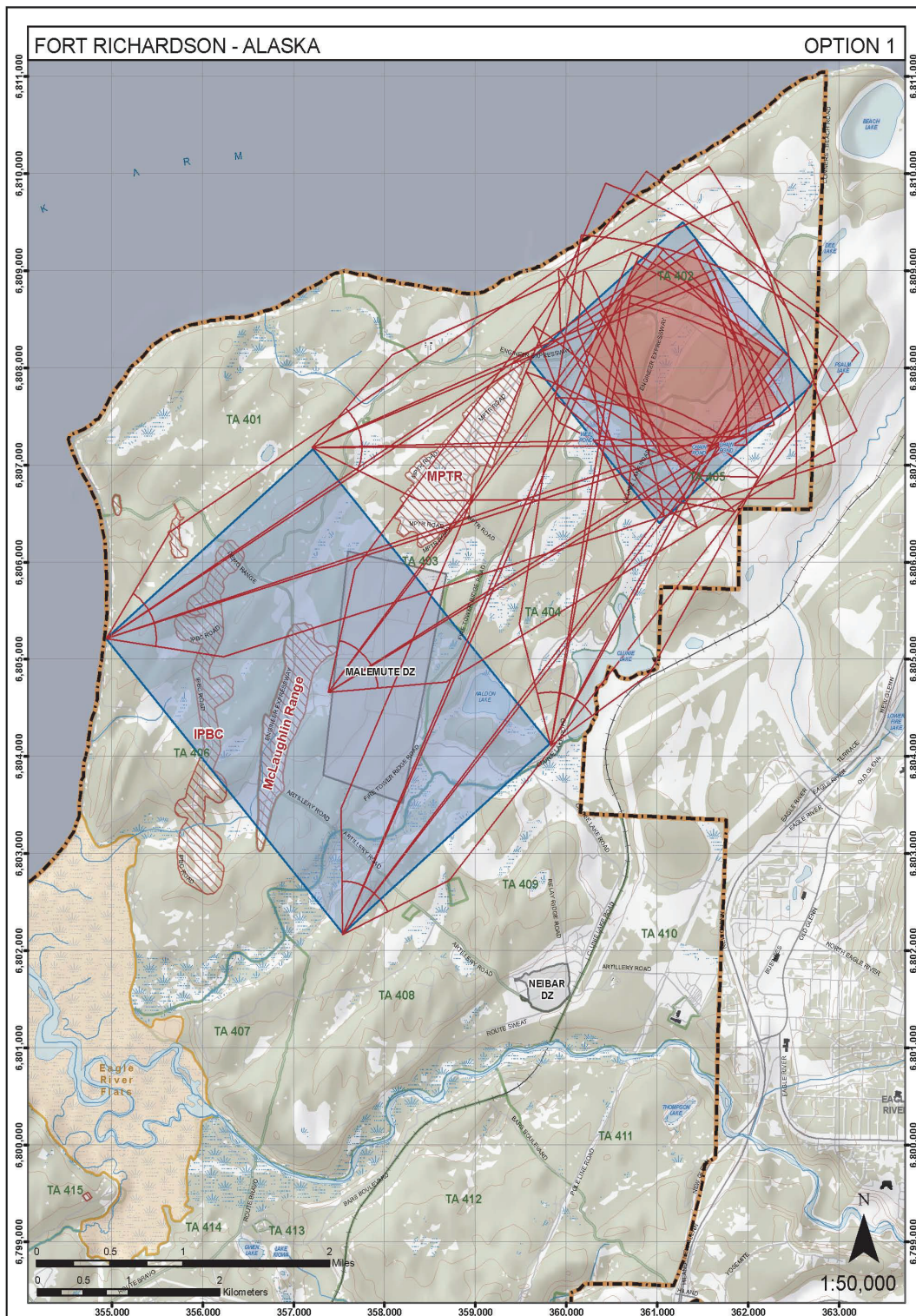
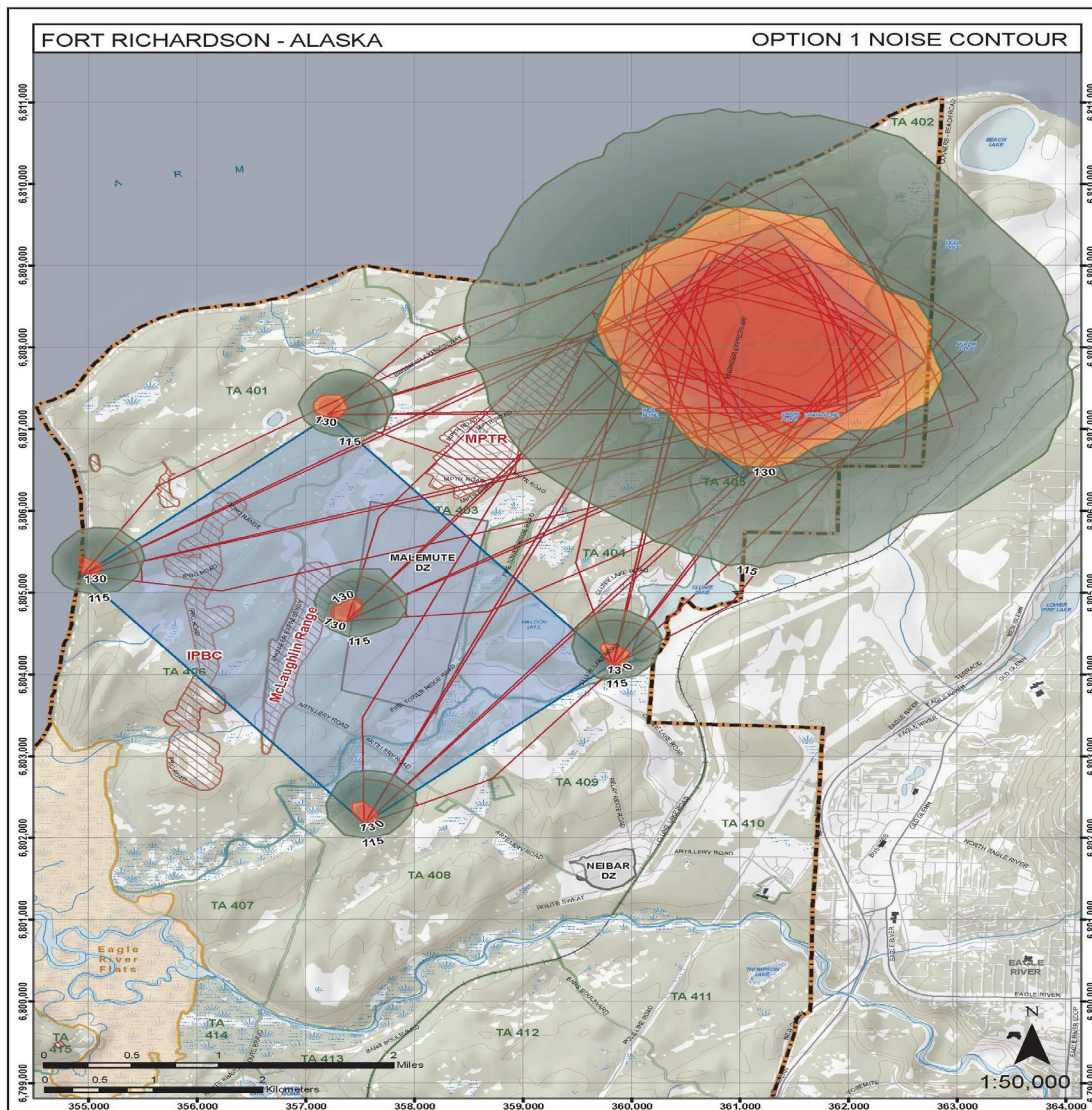


Figure 4-1.2



4.2.2 Potential Site 2

Criteria 1: Potential site 2 is a NO GO for this criterion. The firing point box of the template overlays the following facilities; Malemute Drop Zone, McGlaughlin Range, the Infantry Platoon Battle Course, and Neibar Drop Zone. It is not practicable to relocate these facilities. However, firing points currently exist in conjunction with these facilities, and sufficient firing points can be implemented to support the proposed impact area. As a result the facilities conflicting with the firing point box do not require relocation. The impact area box falls directly over the Multi Purpose Training Range (MPTR). This is a permanent fixed

automated range required primarily for crew gunnery qualification. The site orientation and location for the range was selected based on the capabilities and ranges of the systems firing on it, and the requirement for it to be on a relatively flat piece of ground. The current location of the MPTR is the only feasible location on Fort Richardson for this facility, and the capabilities it provides cannot be replicated elsewhere on the installation.

Criteria 2: Potential site 2 is a GO for this criterion. This potential site does not conflict with any public transportation routes.

Criteria 3: Potential site 2 is a NO GO for this criterion. The noise contour overlay associated with the impact area box indicates that the noise levels beyond the boundary would exceed allowable limits (130 db). There are no adjustments that can be made to the firing point box that would preclude this condition.

Criteria 4: Potential site 2 is a NO GO for this criterion. Portions of the Surface Danger Zone, in conjunction with the impact area box, extend beyond the installation boundary. There are no adjustments that can be made to the firing point box that would preclude this condition.

Figure 4-2.1

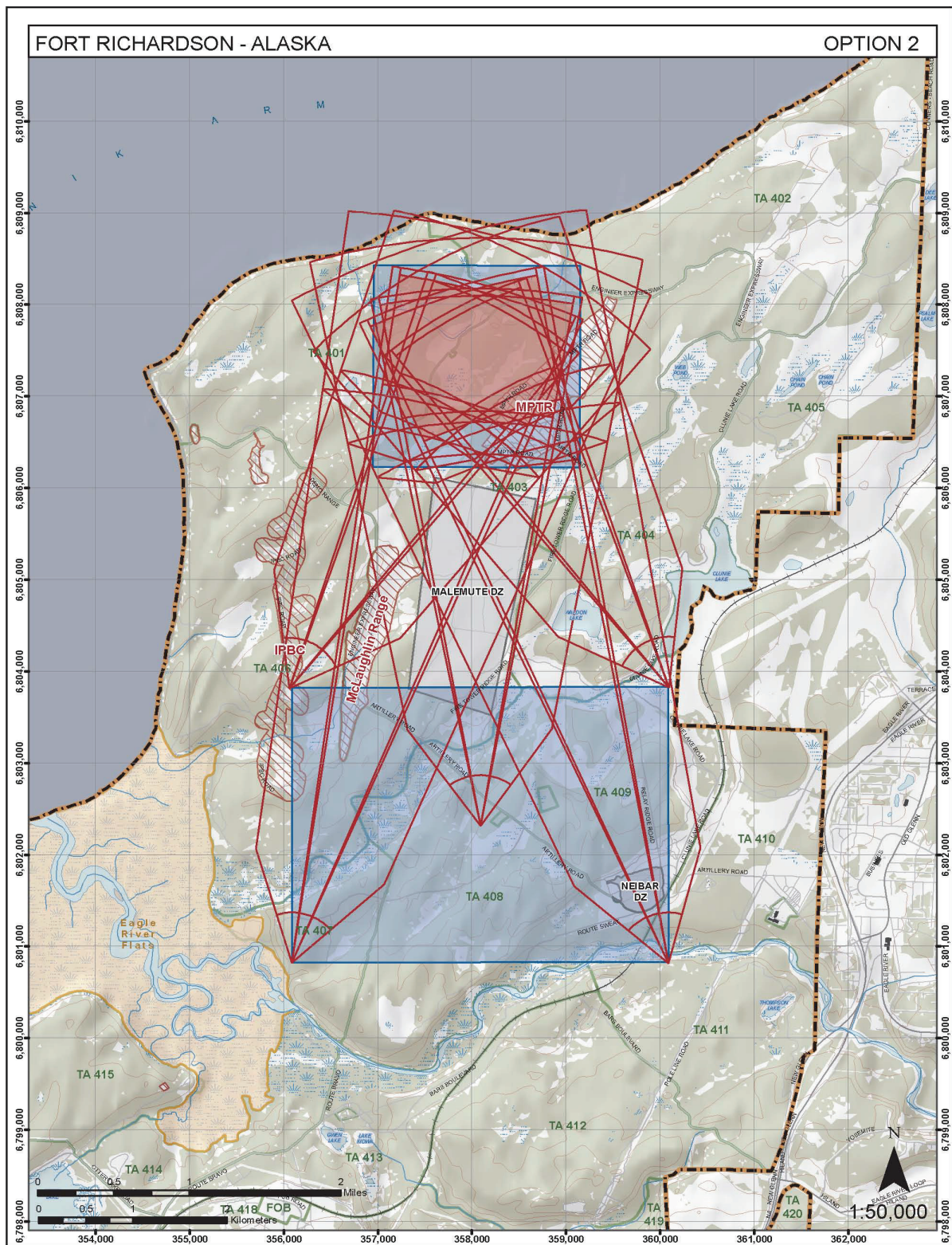
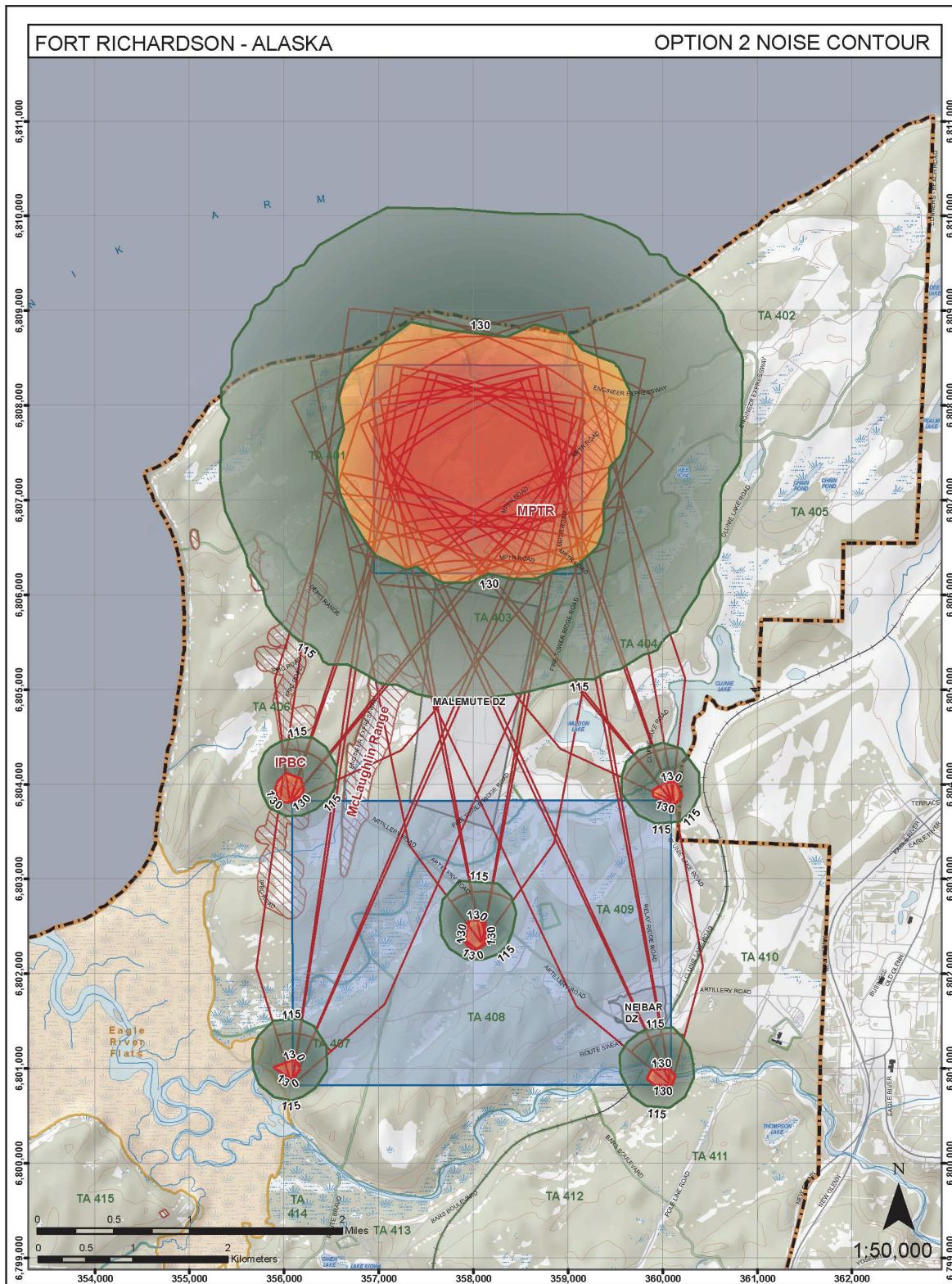


Figure 4-2.2



4.2.3 Potential Site 3

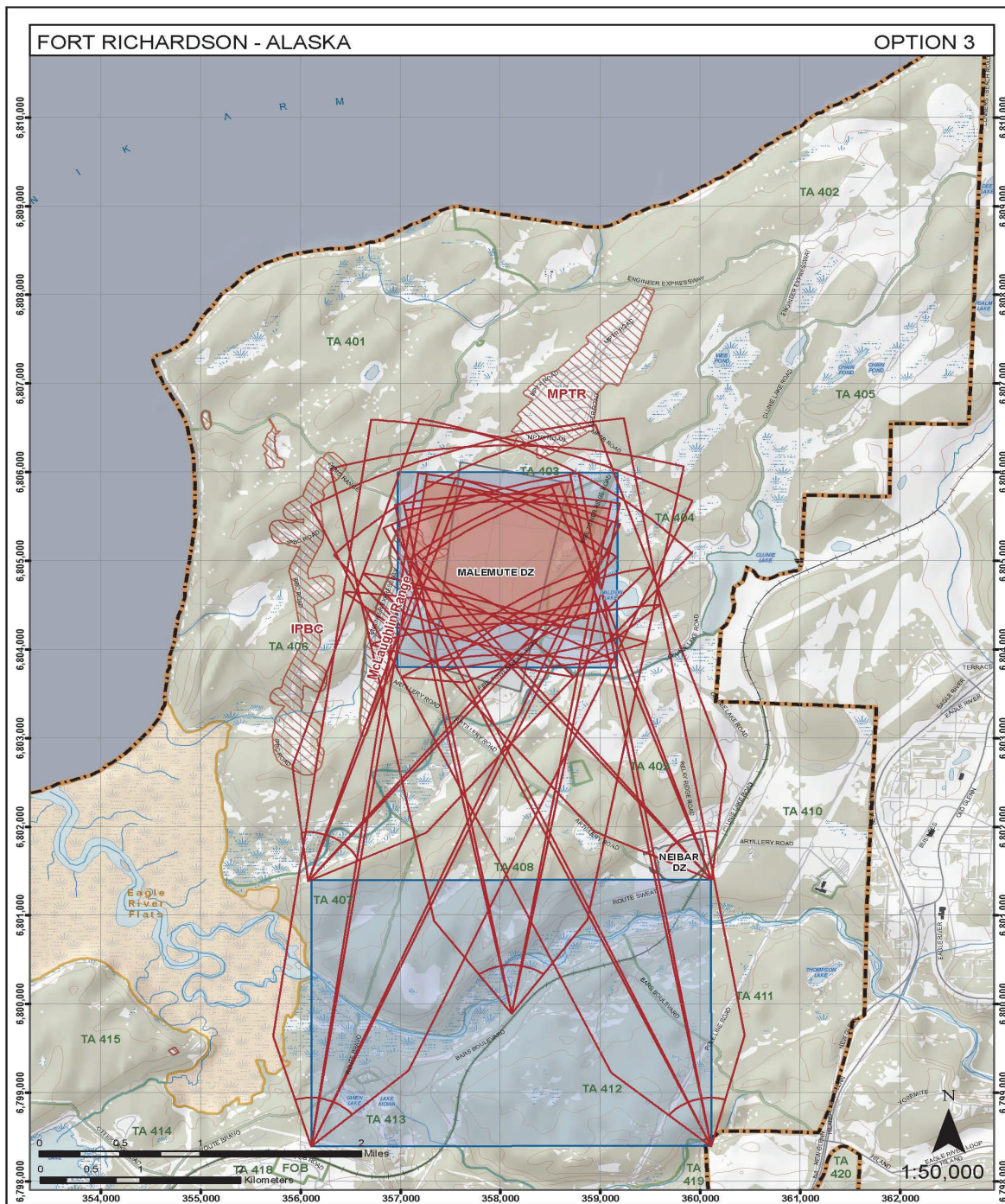
Criteria 1: Potential site 3 is a NO GO for this criterion. The impact area box falls directly over the Malemute Drop Zone (DZ)/Flight Landing Strip (FLS). This is a permanent facility that provides a drop zone for large formations, and a C-130 capable assault landing strip. The drop zone capability is required for the units stationed at Fort Richardson to maintain their individual parachuting proficiency. Spatial and terrain constraints preclude relocation or replication of this facility at another location on the installation. It should also be noted that the firing point box overlays significant portions of Route Bravo; analysis of whether this conflict can be resolved is not necessary given the discussion above.

Criteria 2: Potential site 3 is a NO GO for this criterion. The firing point box is bisected by the Alaska Railroad right of way. There is not enough space available to the west of the railroad corridor to accommodate an adequately-sized firing point box. Therefore, to meet training requirements this site would necessitate firing points to the east of the railroad corridor and, as a result, firing over a public transportation route.

Criteria 3: Potential site 3 is a GO for this criterion. The initial position of the template shows that there would be an issue with the noise levels resulting from firing from the south east corner of the firing point box. Since it would be necessary to reconfigure the firing point box to the west of the railroad right of way this is no longer creates a conflict.

Criteria 4: Potential site 3 is a GO for this criterion. All portions of the SDZ are contained within the installation boundary.

Figure 4-3.1



4.2.4 Potential Site 4

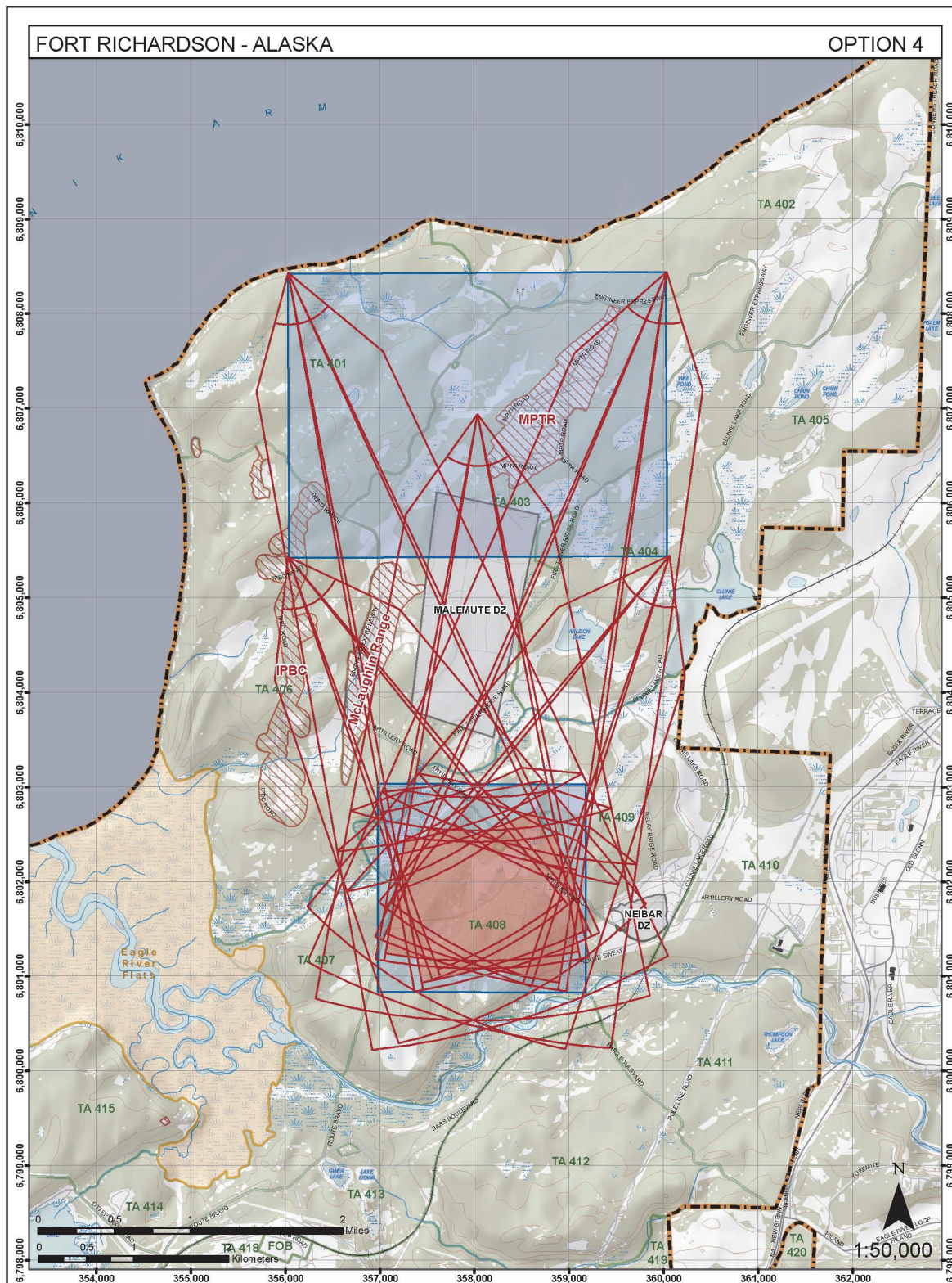
Criteria 1: Potential site 4 is a NO GO for this criterion. The firing point box of the template overlays the following facilities; Malemute Drop Zone, the Infantry Platoon Battle Course (IPBC), and the Multi Purpose Training Range (MPTR). Firing points currently exist in conjunction with these facilities, and sufficient firing points can be implemented to support the proposed impact area. As a result the facilities conflicting with the firing point box do not require relocation. The impact area box overlays significant portions of Route Bravo. Route Bravo is an improved and hardened road that provides the sole means of year-round access for military combat vehicles to training areas and ranges north of Eagle River. Given terrain constraints and the substantial cost of rerouting a major road, it is not practicable to re-route this road so as to avoid conflict with the template.

Criteria 2: Potential site 4 is a GO for this criterion. This potential site would not result in firing over any public transportation routes.

Criteria 3: Potential site 4 is a GO for this criterion. This potential site does not present any noise conflicts since the 130 db line does not cross the installation boundary.

Criteria 4: Potential site 4 is a NO GO for this criterion. Portions of the Surface Danger Zone, in conjunction with the impact area box, extend onto the Alaska Railroad corridor, which is private property and considered beyond the installation boundary. There are no adjustments that can be made to the firing point box that would preclude this condition.

Figure 4-4.1



4.2.5 Potential Site 5

Criteria 1: Potential site 5 is a GO for this criterion. The firing point box of the template overlays the following facilities; Malemute Drop Zone, McGlaughlin Range, and the Infantry Platoon Battle Course. Firing points currently exist in conjunction with these facilities, and sufficient firing points can be implemented to support the proposed impact area. As a result the facilities conflicting with the firing point box do not require relocation. The impact area box does not conflict with any hardened facilities.

Criteria 2: Potential site 5 is a NO GO for this criterion. This impact area box overlays the railroad right of way and would thus necessitate firing over a public transportation route.

Criteria 3: Potential site 5 is a NO GO for this criterion. The noise contour overlay associated with the impact area box indicates that the noise levels beyond the boundary would exceed allowable limits (130 db). There are no adjustments that can be made to the firing point box that would preclude this condition.

Criteria 4: Potential site 5 is a NO GO for this criterion. Portions of the Surface Danger Zone, in conjunction with the impact area box, extend onto the Alaska Railroad corridor, which is private property and considered beyond the installation boundary. There are no adjustments that can be made to the firing point box that would preclude this condition

Figure 4-5.1

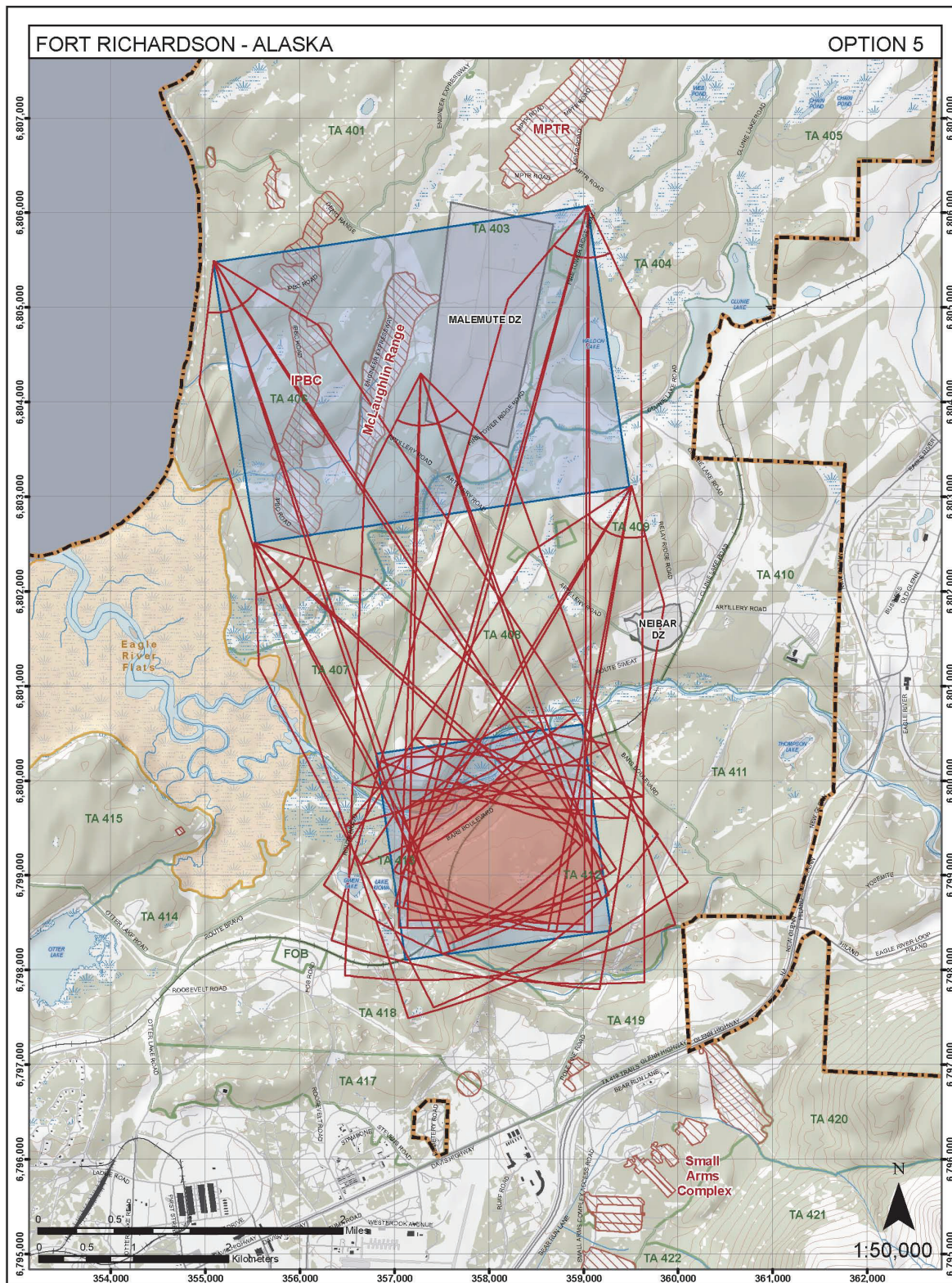
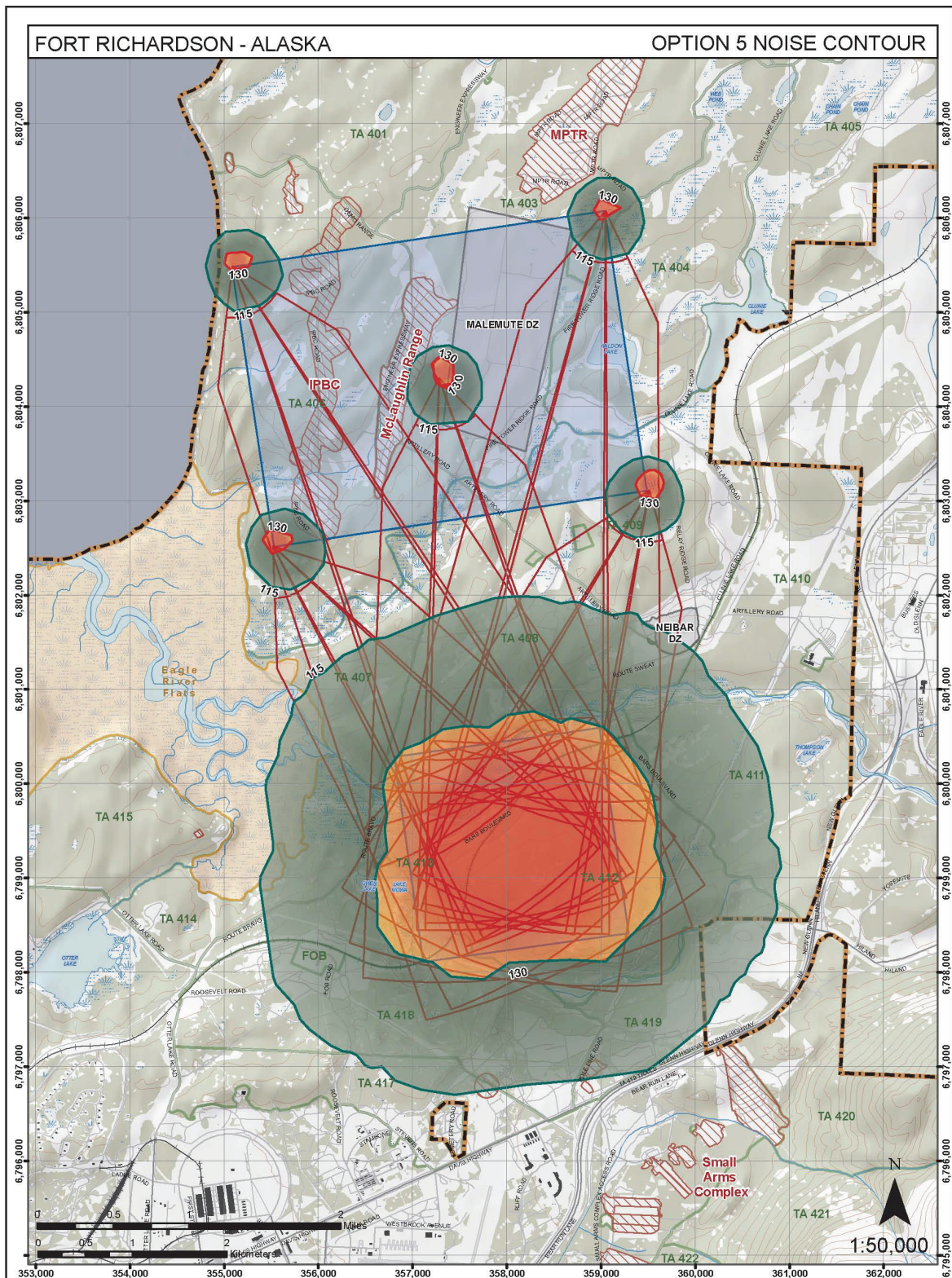


Figure 4-5.2



4.2.6 Potential Site 6

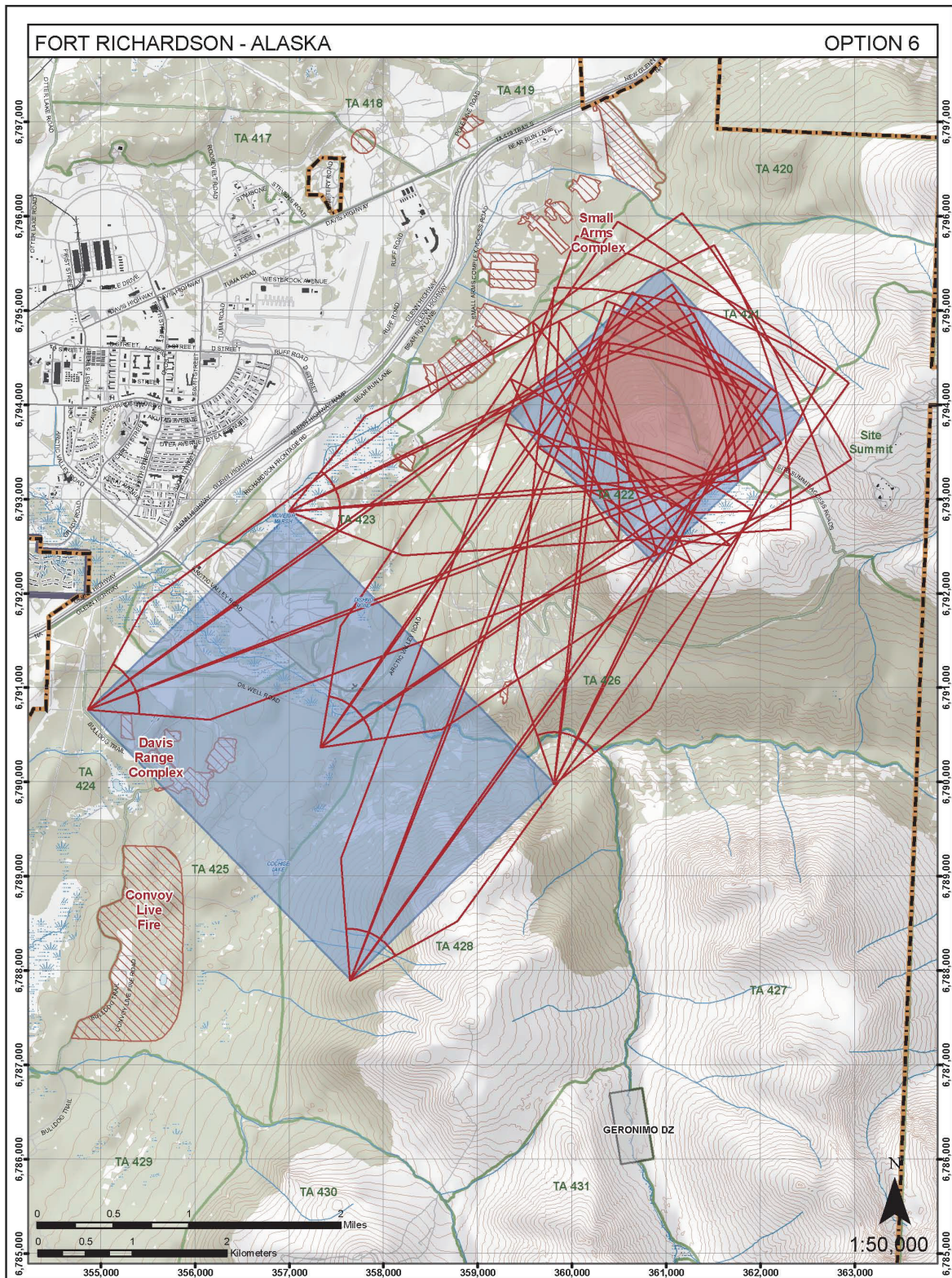
Criteria 1: Potential site 6 is a NO GO for this criterion. The impact area box does not conflict with any hardened facilities. The firing point box overlays the Infantry Squad Battle Course (ISBC), the Urban Assault Course (UAC), the Shoot House, and the installation water treatment plant. Although it is not practicable to relocate these facilities, it may be possible to reconfigure the firing point box around this area, or to incorporate firing points amongst these facilities. Meanwhile, the firing point box also overlays an improved and hardened portion of Arctic Valley Road. To reiterate, it is not practicable to relocate this public transportation route. There is not sufficient space to resolve this conflict by reconfiguring the firing point box.

Criteria 2: Potential site 6 is a NO GO for this criterion. This potential site would necessitate firing over Arctic Valley Road. In order to eliminate this conflict all of the firing points would have to move to the north of the road. The area available is significantly less than the template and would not provide enough sufficient firing points. Thus, reconfiguration of the firing point box cannot resolve this conflict.

Criteria 3: Potential site 6 is a GO for this criterion. This potential site does not present any noise conflicts since the 130 db line does not cross the installation boundary.

Criteria 4: Potential site 6 is a GO for this criterion. All portions of the SDZ are contained within the installation boundary.

Figure 4-6.1



4.2.7 Potential Site 7

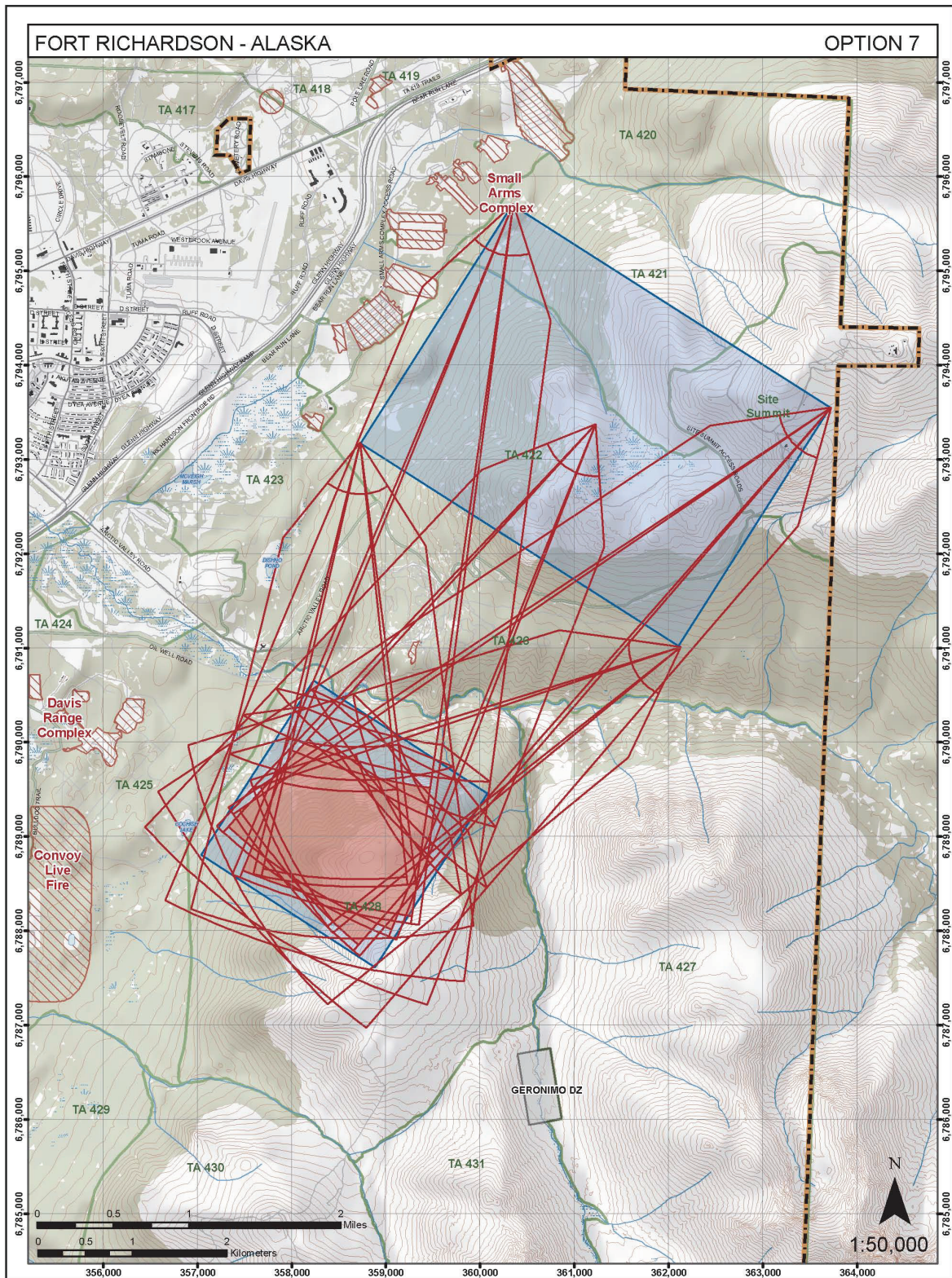
Criteria 1: Potential site 7 is a NO GO for this criterion. The impact area box does not conflict with any hardened facilities. The firing point box of the template overlays a lengthy section of Arctic Valley Road, which cannot be relocated. There is not sufficient space to reconfigure the firing point box to eliminate this conflict.

Criteria 2: Potential site 7 is a NO GO for this criterion. This potential site would necessitate firing over Arctic Valley Road. In order to eliminate this conflict all of the firing points would have to move to the south of the road. The area available is significantly less than the template and would not provide enough sufficient firing points. Thus, reconfiguration of the firing point box cannot resolve this conflict.

Criteria 3: Potential site 7 is a GO for this criterion. This potential site does not present any noise conflicts since the 130 db line does not cross the installation boundary.

Criteria 4: Potential site 7 is a GO for this criterion. All portions of the SDZ are contained within the installation boundary.

Figure 4-7.1



4.2.8 Potential Site 8

Criteria 1: Potential site 8 is a NO GO for this criterion. The impact area box overlays a portion of the Convoy Live Fire Facility / IEDD Lane. Additionally, the firing point box of the template overlays the following facilities; Infantry Squad Battle Course (ISBC), the Urban Assault Course (UAC), the Shoot House, Arctic Valley Road, and the installation water treatment plant. It is not practicable to relocate Arctic Valley Road. Due to the location and orientation of Arctic Valley Road, as well as the presence of Ship Creek and other terrain constraints, it is not possible to reconfigure the firing point box to resolve this conflict.

Criteria 2: Potential site 8 is a NO GO for this criterion. This potential site conflicts with Arctic Valley Road. In order to eliminate this conflict all of the firing points would have to move to the south of the road. The area available is significantly less than the template and would not provide enough sufficient firing points. Thus, reconfiguration of the firing point box cannot resolve this conflict.

Criteria 3: Potential site 8 is a GO for this criterion. The noise contour overlay associated with the firing point box indicates that the noise levels beyond the boundary would exceed allowable limits (130 db). However, this particular conflict could be resolved through reconfiguration of the firing point box.

Criteria 4: Potential site 8 is a GO for this criterion. All portions of the SDZ are contained within the installation boundary.

Figure 4-8.1

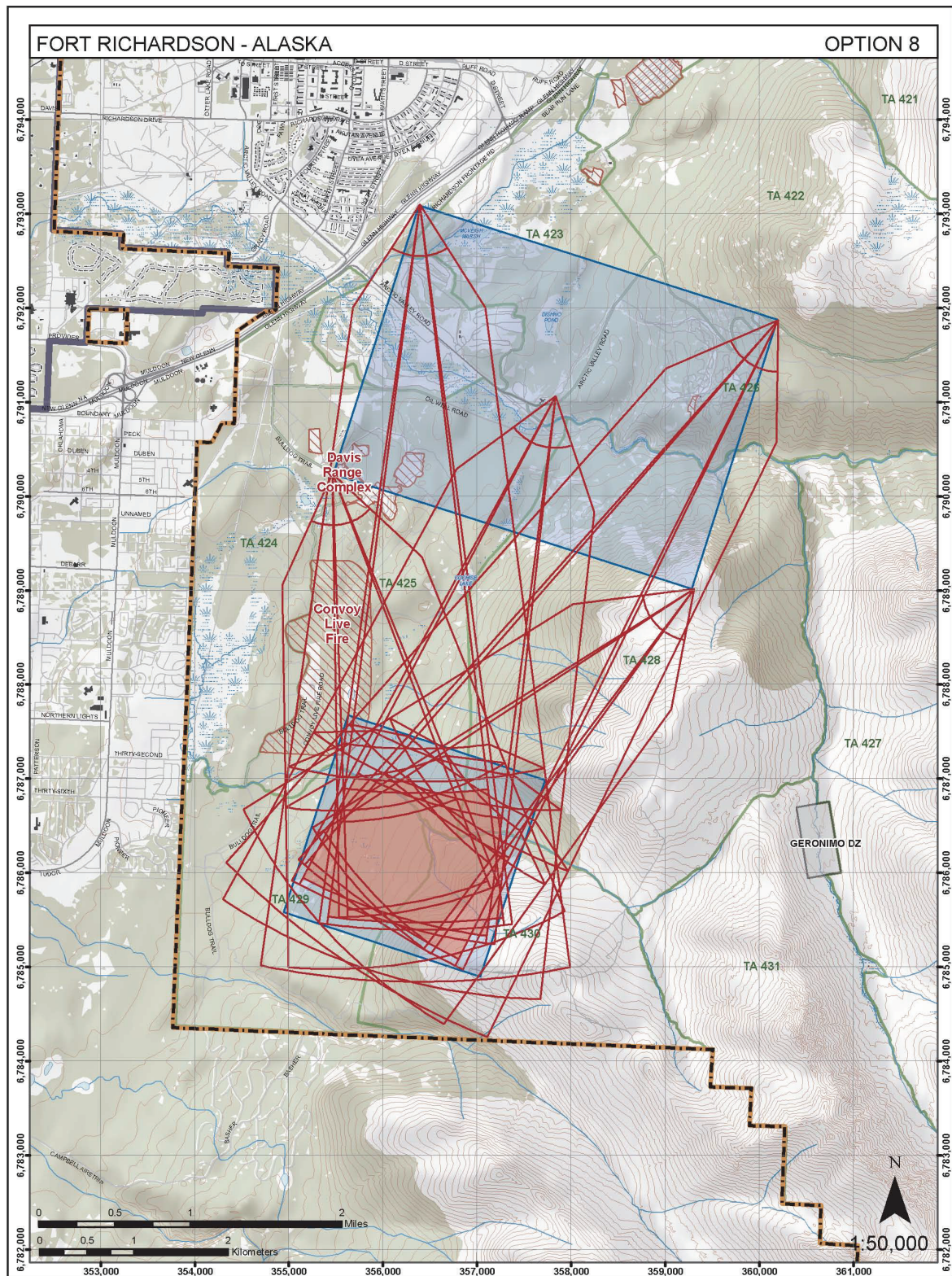
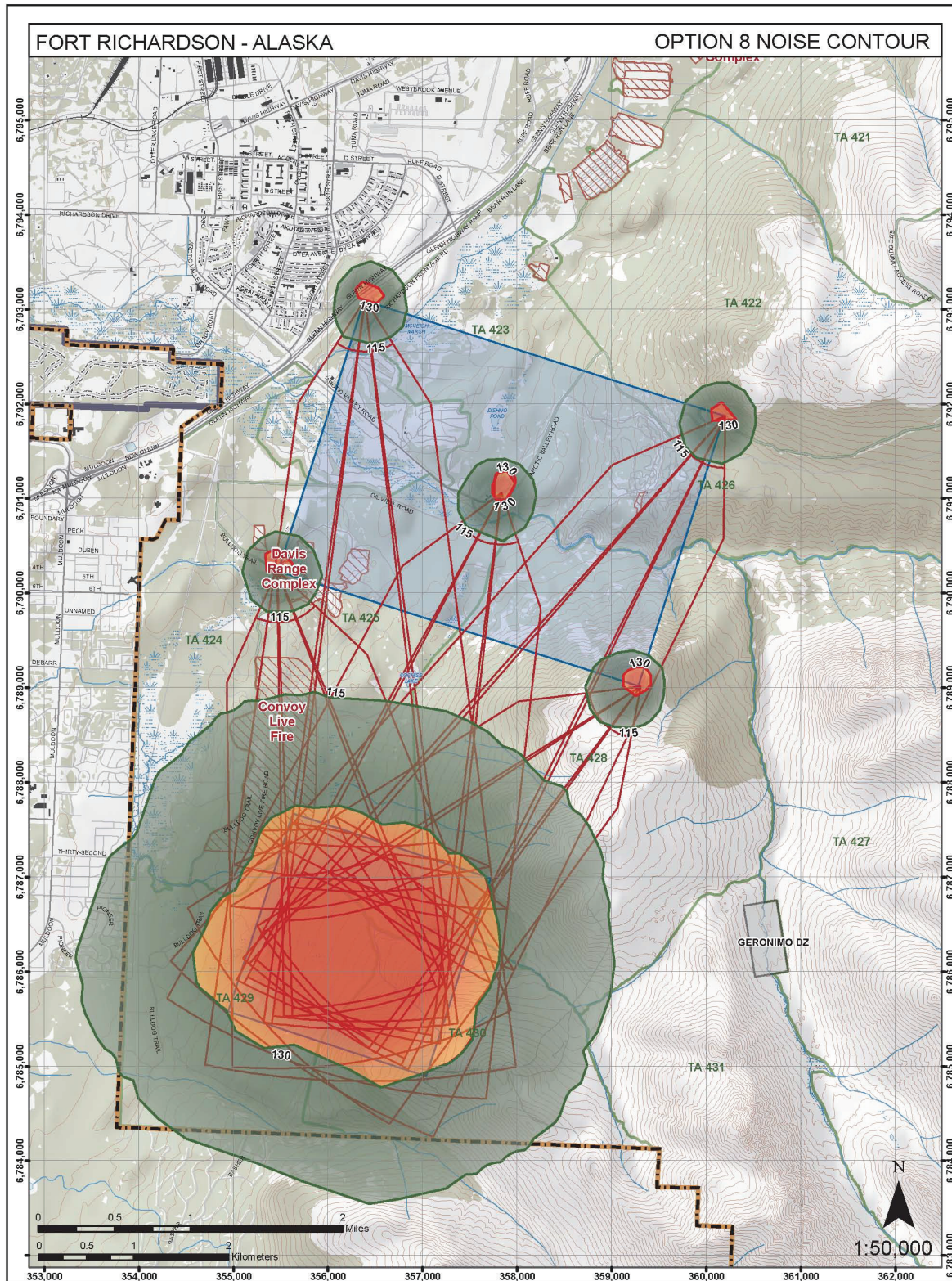


Figure 4-8.2



4.2.9 Potential Site 9

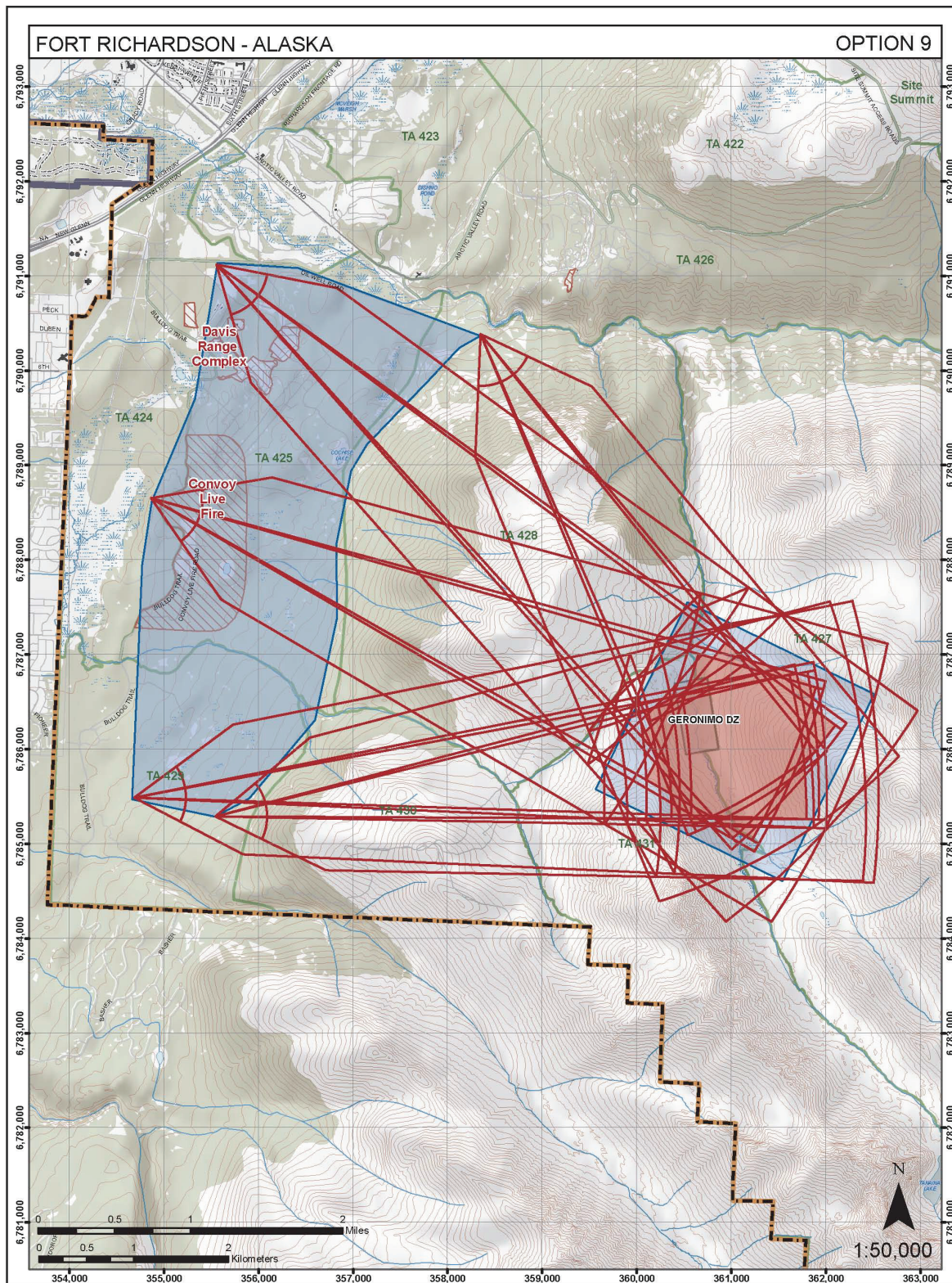
Criteria 1: Potential site 9 is a GO for this criterion. The firing point box of the template overlays the Convoy Live Fire Course / IEDD Lane. Sufficient firing points can be implemented to support the proposed impact area without requiring the range to be relocated. The impact area box would not overlay any hardened facilities. It should be noted that the impact area does overlay Geronimo DZ. Geronimo DZ does not feature any significant level of development and is not considered a hardened facility. Moreover, there are other potential areas where the drop zone could be relocated or replicated.

Criteria 2: Potential site 9 is a GO for this criterion. This potential site does not conflict with any public transportation routes.

Criteria 3: Potential site 9 is a GO for this criterion. The noise contour overlay associated with the firing point box initially indicates that while the noise levels beyond the boundary would exceed allowable limits (130 db), the firing point box can be modified to eliminate any conflict. The impact area box noise contours are within acceptable parameters.

Criteria 4: Potential site 9 is a GO for this criterion. All portions of the SDZ are contained within the installation boundary.

Figure 4-9.1



4.2.10 Potential Site 10

Criteria 1: Potential site 10 is a GO for this criterion. The template does not overlay any hardened facilities. It should be noted that the firing point box overlays Geronimo Drop Zone. However, Geronimo DZ is not developed and not considered a hardened facility. Moreover, there is sufficient space to emplace enough firing points without having to move the DZ.

Criteria 2: Potential site 10 is a GO for this criterion. This potential site does not conflict with any public transportation routes.

Criteria 3: Potential site 10 is a NO GO for this criterion. The noise contour overlay associated with the impact area box indicates that the noise levels beyond the boundary would exceed allowable limits (130 db). There are no adjustments that can be made to the firing point box that would preclude this conflict.

Criteria 4: Potential site 10 is a NO GO for this criterion. Portions of the Surface Danger Zone, in conjunction with the impact area box, extend beyond the installation boundary. There are no adjustments that can be made to the firing point box that would preclude this condition.

Figure 4-10.1

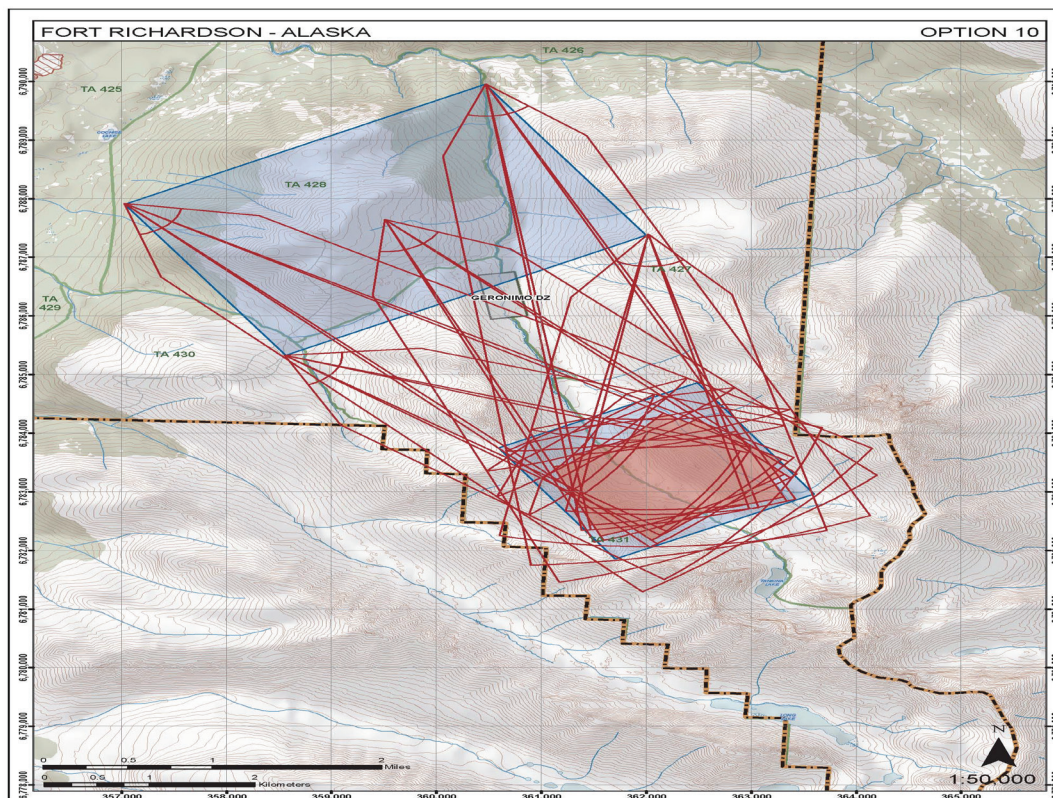
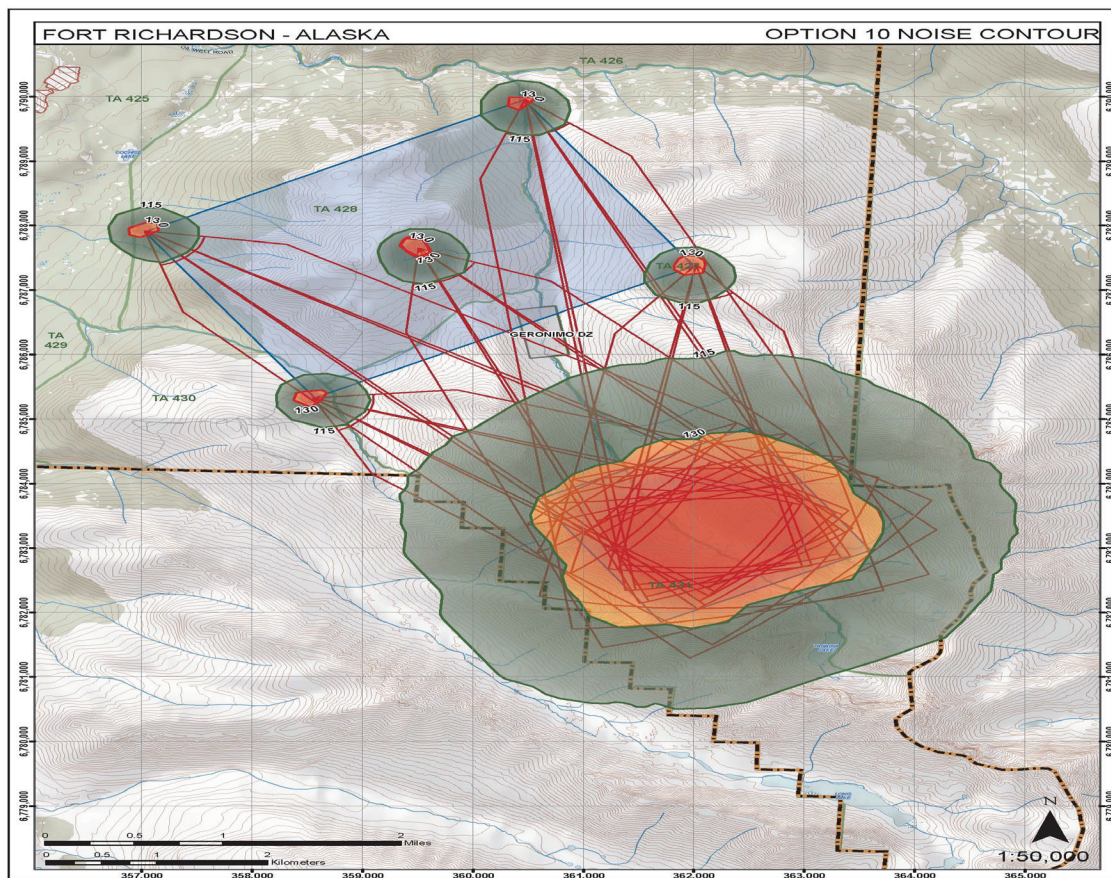


Figure 4-10.2



5.0 CONCLUSION

This analysis uses essential training and safety-related criteria to evaluate the feasibility of siting a new impact area on Fort Richardson. The results of this analysis demonstrate that that Potential Site 9, after practicable reconfiguration of the firing point box, is the only location on Fort Richardson capable of supporting a new impact area.

6.0 REFERENCES

ANSI 1990

AR 200-1

AR 385-63

FM 3-22.90, Mortars, December 2007

FM 6-50, Tactics, Techniques, and Procedures for the Field Artillery Cannon Battery,
December 1996

DA Pam 385-63

DA Pam 350-38, Standards in Weapons Training, 2008

Transformation EIS (USARAK 2003)

USARAK 350-2