

1. Executive Summary

The proposed gun range on Millville Plains, if constructed and operating, would become an engine for wildland fire creation, significantly increasing the number and severity of wildfires. The livelihood of the communities of Northern California and the traveling public would be in constant peril, both from wildfires and errant rifle bullets.

- a) The proposed gun range property lies entirely within a VERY HIGH Wildland Fire Hazard Severity Zone. This zone classification is an immutable characteristic of the terrain, fire history, and weather, and cannot be mitigated by defensible space, maintenance, and any other human-caused actions.
- b) Shooting-caused wildfires can initiate within an area of 2,559 acres (3.998 square miles) and over 4 miles from the 60 rifle firing positions, where 60 people could be firing at the same time.
- c) Steel or copper bullets are proven to be the primary source of gun range-caused fires. After striking a hard target, such as a rock, the bullet will fragment, producing metal particles as hot as 1400° F. Compare this to personal fireworks, producing sparks at temperatures of 1200° F, which have been illegal in Shasta County since May 14, 1934 due to extreme fire risk.
- d) See the following videos of U.S. Forest Service testing about shooting-caused wildfires:
<https://www.youtube.com/watch?v=DBVm5Lw8JKg>
<https://www.youtube.com/watch?v=QQLOoHQv5Z4>
- e) Steel or copper-jacketed steel bullets are the only type of bullets allowed on the proposed rifle ranges.
- f) Defensible space and a fire suppression system at the clubhouse and firing line of the proposed gun range will not prevent or reduce the severity of wildfires caused by errant rifle bullets.
- g) Rate of wildfire advance on grassland is 20% of wind speed.
- h) On a non-Red Flag Warning Day, a grass fire on Millville Plains could advance at 2 mph.
- i) The Bascom Fire, which started in the immediate vicinity of the proposed shooting complex on June 23, 2018, burned 328 acres and was not contained until January 4, 2019: 195 days later.
- j) 257 shooting-caused fires in California, excluding those caused by incendiary ammunition or exploding targets from 2012 to 2022, burning a total of 25,625 acres.
- k) 753 wildfires reported in 11 western states caused by shooting at inert targets from 1992-2018.
- l) Ten PG&E 500,000 volt towers, 41 lesser-voltage towers, and 2.2 miles of high-voltage lines cross directly into the line of fire from 60 rifle firing positions.
- m) A hunter's stray rifle bullet brought down a power line sparking a brush fire in Bern Township, Pennsylvania, on Dec. 3, 2013.
- n) 97 homes and businesses and 5½ miles of CA Highway 44 (with 5,500 vehicles/day) are in range of errant rifle bullets.
- o) Any bullet that leaves the gun range has sufficient velocity to penetrate the human skull.

2. Background

The Superior Court of California for the County of Shasta on March 10, 2025, ordered Shasta County to vacate its approval of a proposed outdoor gun range in violation of the California Environmental Quality Act (CEQA). The gun range was intended to be built on land owned by Patrick Jones, who applied for a zoning and land use change to his property so that his designed shooting complex could be built. A lawsuit brought by concerned residents ("Anderson/Millville Residents") (Petitioner) against the County alleged that the

County did not require an Environmental Impact Report (EIR) when approving the gun range project, but instead relied upon an Initial Study/Mitigated Negative Declaration (IS/MND) to approve the project.¹

In its ruling, the Court agreed with 11 of the 12 specific areas of environmental impact which the Petitioner argued that the County failed to take into account in issuing the IS/MND. Among the 11 areas cited were: deficiencies in plant surveys, impacts on nesting birds and special status/fully protected species, noise impacts on wildlife, impacts to wetlands, impacts to bald eagle and golden eagles, impacts to vernal pool crustaceans, and impacts to movement corridors and nursery sites.

Notably absent in the ruling were references to the increased risk of wildfires and the dangers to public safety that the rifle ranges (the outdoor gun range project includes 61 rifle firing positions) present to the community. The Court was constrained to look at only the evidence that had been obtained prior to the County's approval, and unfortunately, there was a lack of documentation regarding the increased risk of wildfires and the public safety hazard of the rifle ranges.

In an interview with a local television station following the ruling by the Court, Patrick Jones stated "The County made the right decision before. This project should've moved forward on a Mitigated Negative Declaration. We'll do it again; we'll cover the issues that they have. This one is pretty straight forward, so it's not a difficult EIR to do. I look forward to going through with that process. I'll have an active role in a variety of functions as we go through that."²

Because of Patrick Jones' stated intentions, the Anderson/Millville Residents who brought the original lawsuit believe that the increased risk of wildfires and the dangers to public safety to the residents of Northern California cannot be ignored again. The hazards of a High Plains Shooting Sports Center (hereafter, "gun range"), if constructed and operating, must be well documented and disseminated.

3. Design of Shooting Facilities

The design of a gun range should be done by experts experienced in range planning and design. The National Rifle Association (NRA), when discussing design of shooting facilities, states:

"Proper design work requires a practical understanding and knowledge of local ordinances, codes and engineering principles. It is recommended that an engineer, architect or consultant experienced in range planning and design be consulted for this type of project. ...

"The Range Source Book is a technical publication for shooting range builders and operators. All information contained herein is in the form of suggested practices only, and no standards are stated or implied. ... Nothing contained herein shall be construed as a standard for the evaluation of any specific shooting facility."³

4. Increased Wildfire Danger from Outdoor Open Rifle Ranges and Camping

The following is evidence to support the claim that an outdoor shooting complex on Millville Plains,⁴ if constructed and operating, will increase the likelihood of wildfires:

¹ Ruling on Verified Petition for Writ of Mandate, Superior Court of the State of California for the County of Shasta, Case #23CV-0203713, Ruling dated March 10, 2025 and filed March 11, 2025.

² Action News Now; televised interview with Patrick Jones, March 12, 2025.

³ The Range Source Book. National Rifle Association Range Services. 11250 Waples Mill Road, Fairfax, VA 22030; 2023. p. 8.

⁴ References will be made in this paper to the original gun range design as approved by Shasta County Planning Commission Resolution 2023-010

- a. Bullets and **resulting ricochets** have significant potential to start wildfires.
 - 1) Wildfires starting at gun ranges was brought up at the Shasta County Board of Supervisors Meeting: “Today, as of right now, we have not had a fire out at the gun range this year, which is abnormal.”⁵ (Fire Chief O’Hara)
 - 2) Steel core and steel jacket ammunition is not allowed during the dry season on the Dillman Outdoor Range (in Lincoln, California) due to dry vegetation.⁶
 - 3) There have been 257 shooting-caused fires in California, excluding those caused by incendiary ammunition or exploding targets from 2012 to 2022, burning a total of 25,625 acres. See Table 1.

Table 1. Shooting-caused Wildfires in California Excluding those Caused by Incendiary Ammunition or Exploding Targets; 2012-2022⁷

Year	Number of Shooting Caused Fires in California	Acres Burned
2012	30	880
2013	36	3,472
2014	19	69
2015	17	277
2016	17	277
2017	30	1,759
2018	19	15,681
2019	22	480
2020	29	2,425
2021	16	173
2022	22	132
Total	257	25,625

A review of the same data from CalFire Redbooks shows that steel ammunition causes more wildfires than lead ammunition.

- 4) There have been 753 wildfires reported in the 11 western states caused by shooting at inert targets from 1992-2018.⁸ “While previously disputed as a plausible ignition source, civilian firearms use has emerged as a wildfire cause of concern in the United States (US). The National Wildfire Coordinating Group (NWCG) included it as a newly recognized fire cause in the wildfire-reporting data standard approved in 2020. ...This is the first time that data on shooting-related fires have been assembled and summarized for the US, with the intention of raising awareness concerning this relatively small but impactful cause of preventable wildfires.”⁹
- 5) Steel or solid copper bullets are recognized as a primary source of gun range-caused fires: “The possibility that civilian firearms use and commercial ammunition could be a

⁵ Fire Chief O’Hara, speaking at Board of Supervisors Meeting 10/24/23 concerning the BLM range in Keswick. From Transcript of meeting, Administrative Record page #01402.

⁶ www.lincolnrifleclub.com; website and Facebook page; 6/11/2025

⁷ Data for each year from CalFire Wildfire Redbooks. Website www.fire.ca.gov

⁸ *Fire Safety Journal; Agency records of wildfires caused by firearms in the United States*. Karen C. Short and Mark A. Finney. USDA Forest Service. 2021. Available online 28 May 2022. <https://doi.org/10.1016/j.firesaf.2022.103622>

⁹ Ibid

significant source of wildfire ignitions had been debated until research revealed some physical mechanisms for ignition by ... conventional rifle bullets... In these cases, dry vegetation may ignite from the ... steel or solid copper bullets from modern rifles after fragmenting against a hard target such as steel or rock...¹⁰ “..the popularity of semi-automatic rifles (‘modern sporting rifles’ e.g., AR-15, AK-47) has increased dramatically during this period [1992-2018], along with demand for inexpensive imported ammunition with steel-jacketed or steel-core projectiles (military surplus).”¹¹ Lead bullets are not allowed on the proposed gun range; only steel or copper-jacketed steel bullets are allowed.

- 6) The previous two paragraphs referenced work by Karen C. Short and Mark A. Finney of the U.S. Forest Service. When asked for further information by the author of this paper, Karen Short replied by email the following:

“Hi Ed,

Thanks for reaching out. I shared your message with Mark Finney (cc’d here), who co-authored the Agency records paper with me, and who has led research into mechanisms of wildfire ignition from firearms use (i.e., target shooting). ... here are links to two videos in which Mark describes some of the relevant research. Perhaps you can use some of this existing material to support your case.

<https://www.youtube.com/watch?v=DBVm5Lw8JKg>

<https://www.youtube.com/watch?v=QQLOoHQv5Z4>

-Karen

Karen C. Short, PhD, Research Ecologist

Forest Service; Rocky Mountain Research Station, Missoula Fire Sciences Laboratory”¹²

- 7) After striking a hard target, such as a rock, the bullet will fragment, producing metal particles as hot as 1400° F.¹³ Compare this to personal fireworks, producing sparks at temperatures of 1200° F,¹⁴ Consumer fireworks have been illegal in Shasta County since May 14, 1934 due to extreme fire risk.¹⁵ If the sparks produced by fireworks have been recognized as a fire risk and outlawed for over 90 years, why should we risk having a gun range on Millville Plains that could start wildfires over an area of almost 4 square miles?¹⁶

b. 51 PG&E High Voltage Transmission Towers Cross the Surface Danger Zone

- 1) Ten Pacific Gas and Electric (PG&E) 500,000 volt transmission towers, 41 lesser-voltage towers and 2.2 miles of high-voltage power lines cross directly into the errant shot fall zone of the three rifle ranges,¹⁷ where 60 people could be shooting at the same time (see Figure 2 and shot fall zone and rifle shooting positions discussed later in this paper); this issue has been forwarded to PG&E Corporate Security¹⁸ and is being monitored by the North Valley

¹⁰ Ibid

¹¹ Ibid

¹² Email from Karen C. Short to Edward B. Wilkes. September 5, 2025 at 8:50 AM.

¹³ Videos linked within email from Karen C. Short to Edward B. Wilkes. September 5, 2025 at 8:50 AM.

¹⁴ <https://www.nfpa.org/downloadable-resources/safety-tip-sheets/fireworks-safety-tips>; ©2024

¹⁵ “Ordinance Prohibiting the sale or discharge of Fireworks within the County.” Shasta County Board of Supervisors Minutes & Minutes Index web page, Monday, May 14, 1934; www.shastacounty.gov; (subsequently given the number “Ordinance No. 196” when the County Clerk was directed on July 21, 1939, to number all ordinances chronologically)

¹⁶ See Attachment A for explanation and calculations for land area subject to shooting-caused wildfires

¹⁷ Count of towers from Shasta County Map Viewer; gis.shastacounty.gov

¹⁸ Email from PG&E to Edward B. Wilkes, July 12, 2024 10:05 AM.

Division Operational PG&E leaders.¹⁹ A hunter’s stray rifle bullet brought down a power line sparking a brush fire in Bern Township, Pennsylvania, on Dec. 3, 2013.²⁰

- c. Bullets impacting vehicles, particularly gasoline tanker trucks and propane delivery trucks, have significant potential to start wildfires, especially if the impact causes the vehicle to overturn and crash (e.g.: gasoline tanker truck crashes causing fires: I-95 in Philadelphia, June 11, 2023; I-95 in Connecticut, May 2, 2024; I-55 in Memphis, Oct. 17, 2024; propane truck crash causing fire: Gridley, CA, Nov. 30, 2020).
 - 1) California State Highway 44 is within range of at least 10 of the most common and popular rifle/ammunition combinations that could be used on the three rifle ranges, where 60 shooters could be firing at the same time.
- d. Overnight camping has the significant potential to start wildfires
 - 1) “Large shooting sports events would be held intermittently and may include RV overnight dry camping in a designated parking area.”²¹
 - 2) There are 27 overnight RV camping stalls without hookups measuring 18 feet by 40 feet on the plans for the proposed shooting complex.²²
 - 3) There have been 1,248 fires caused by camping in California from 2012-2022. See Table 2.

Table 2. Campfire-caused Wildfires in California; 2012-2022²³

Year	Number of Campfire-caused wildfires	Acres burned
2012	106	4,886
2013	123	95
2014	142	229
2015	120	113
2016	121	132,209
2017	111	4,076
2018	103	657
2019	122	2,806
2020	110	421
2021	104	71
2022	86	82
Total	1248	145,645

- e. Prohibition of Shooting on Red Flag Warning Days and Maintaining Defensible Space Will Not Prevent the Spread of Wildfire

The Environmental Checklist Form in the IS/MND states that “The site would also be managed to prevent the spread of wildfire based on weather conditions by closing during red flag warning days and maintaining the fuels and vegetation in accordance with recommendations and requirements for defensible space.”²⁴ Closing during red flag warning days will potentially reduce the uncontrolled spread of wildfire, but will not

¹⁹ Email from Kelly Theveos; PG&E Division Operations Specialist North Valley Division to E.B. Wilkes September 25, 2025

²⁰ www.wfmz.com/news. WFMZ TV. Television Channel 69 News. December 3, 2013.

²¹ Revised Environmental Initial Study & Mitigated Negative Declaration, April 7, 2023.

²² Site Plan – Exhibit A2. Butler Engineering 04/17/2023

²³ Data for each year from CalFire Wildfire Redbooks. Website www.fire.ca.gov

²⁴ Revised Environmental Initial Study & Mitigated Negative Declaration, April 7, 2023. P.1

prevent it. Furthermore, maintaining defensible space on the proposed gun range property barely scratches the surface of the land area subject to bullet-caused wildfires.

1) Red Flag Warning Days

- a) Definition. CalFire states that a Red Flag Warning is “Issued by the National Weather Service for weather that will occur within 24 hours. These watches and warnings are called because of a combination of high temperatures, low humidity, and high winds. They can also be issued when there is a possibility of dry lightning.”²⁵ The National Weather Service states: “Red Flag Warnings alert fire managers on federal lands to conditions that are highly unfavorable for prescribed burns and that may lead to especially dangerous wildfire growth. To issue a Red Flag Warning, we need the following:
 - Ten-hour fuels of 8% or less. This parameter describes how much water is held by small vegetation such as grass, leaves, and mulch that take only about ten hours to respond to changes in dry/wet conditions.
 - Relative humidity (RH) less than 25% for several hours. RH depicts how much water is in the air, relative to the temperature of the air.
 - Winds 20 feet off the ground of at least 15 mph for several hours.”²⁶
- b) Application to Millville Plains. An evaluation of a dataset of 58 grassland fires in Australia resulted in a thumb rule where the rate of fire advance is 20% of the wind speed. The dataset had a range of wind speeds from 20-62 km/h (12.4-38.5 mph) producing a rate of fire advance from 1.6-17 km/h (1-10.6 mph). The conditions were an average of 1.9 hours of fire run, air temperature 98.6°F, RH 12.4%, and moisture content of the grasses 3.7%.²⁷ Similarly, a rule of thumb for conifer forests is that the rate of fire advance is 10% of wind speed, over a wide range of environmental conditions.²⁸
- c) From the above information, it is easily seen that on hot, dry days, with a breeze somewhat less (say, 13 mph) than that required for a Red Flag Warning, a grass fire on Millville Plains could have a rate of advance of about 2 miles per hour, and if the fire spread to the trees (e.g., in the Bear Creek drainage) through ladder fuels, a rate of advance of 1 mph. It is extremely important to note that the Red Flag Warning applies to “dangerous wildfire growth,” that is, to a wildfire that is already in progress, and not to the initiation of a wildfire. To reduce the risk of a wildfire starting in the first place, the standard is to reduce the chances for initiation of a fire, and to reduce the fuels available for a fire (maintain defensible space).

2) Defensible Space for the Proposed Gun Range

The concept of defensible space is excellent when referring to the safety of people and structures, but has little meaning when applied to a rifle range set down in a hot dry grassland plain. Clearing the grounds of combustibles for 100 feet around a clubhouse and rifle shooting positions means little when a steel or copper-jacketed steel bullet can travel 4 miles from the shooter and ignite dry vegetation, as discussed in Sections 4.a and 4.e.3 of this paper. Likewise, a fire suppression system at the gun range is meaningless when a fire can start miles from the suppression system.

²⁵ CalFire Commonly Used Terminology. <https://www.fire.ca.gov>

²⁶ What Is a Red Flag Warning? National Weather Service. www.weather.gov

²⁷ “Estimating Wildfire Rate of Spread in Grasslands” Marty Alexander, PhD, RPF. Canada Wildland Fire Conference Oct. 31-Nov. 4, 2022. Edmonton, Alberta. <https://www.frames.gov>

²⁸ “A Rule of Thumb for Estimating a Wildfire’s Forward Spread Rate from Wind Speed Alone” Alexander & Cruz. Canada Wildland Fire Conference November 18-21, 2019. Ottawa, Ontario.

3) Shooting-Caused Wildfires Can Initiate Within an Area of Over 1700 Acres and Up to 4 Miles from the Shooter

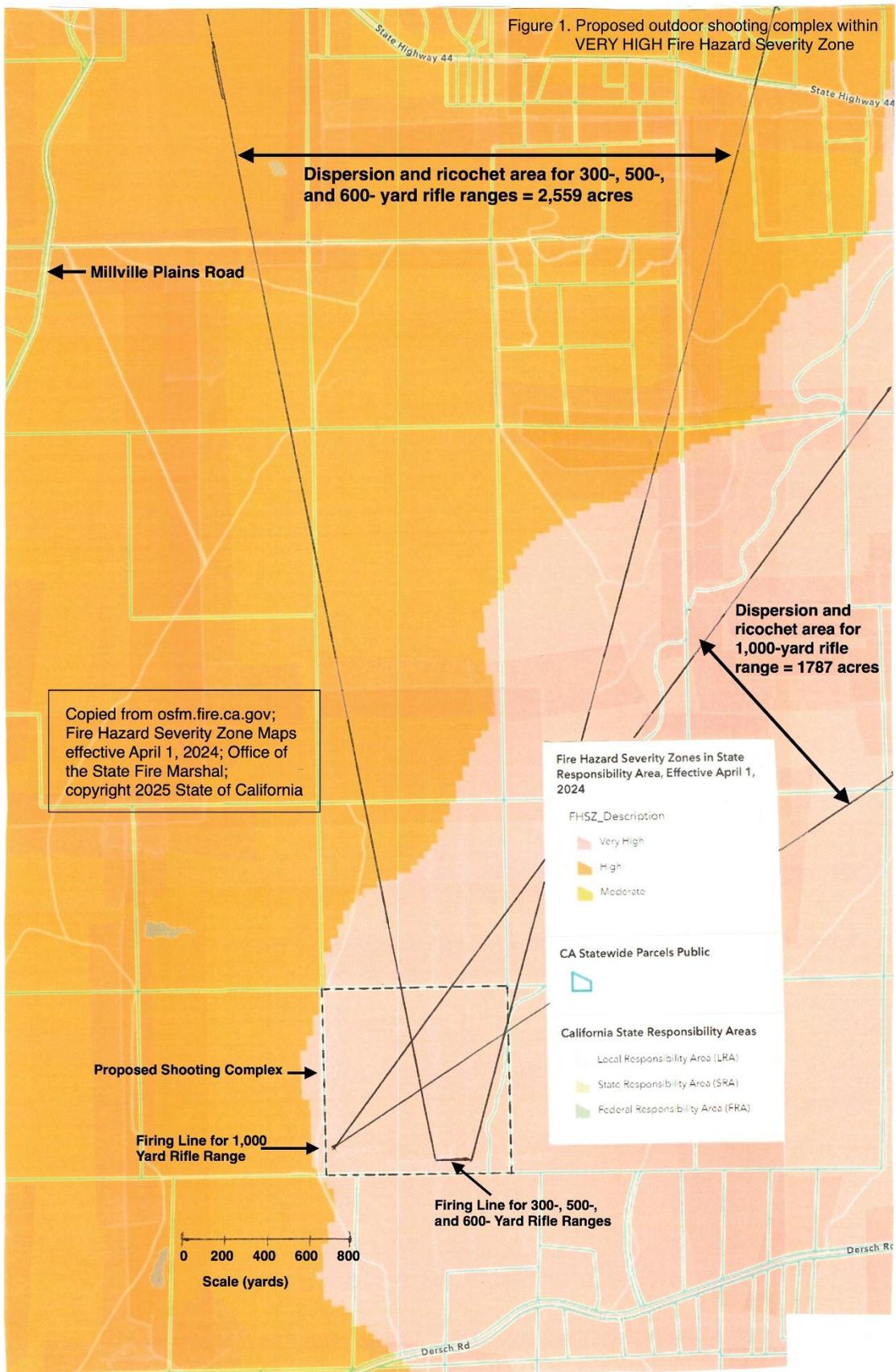
Perhaps unique among anthropogenic wildfires is the fact that the wildfire can be initiated at a great distance from the human's location, limited only by the rifle/ammunition used. An errant bullet, missing the target and backstop at a rifle range, could travel over a low hill and start a wildfire out of sight and up to four miles from the shooter. The NRA lists 29 commercial standard rifle ammunition calibers with a median maximum range of 3,750 yards, and 26 commercial magnum rifle ammunition calibers with maximum ranges from 2,400 to 7,000 yards (approximately 4 miles) with a median maximum range of 4,475 yards.²⁹ Applying an accepted surface danger zone (SDZ) dispersion of 5 degrees from either side of the line of fire,³⁰ and an additional 5 degrees for ricochet,³¹ this equates to a median area of 507 acres for standard ammunition, and 722 acres for magnum rifle ammunition where a bullet could cause a wildfire (a maximum range of 4 miles equates to an area subject to bullet-caused wildfire of 1,787 acres, or 2.79 square miles). The three rifle ranges (300-, 500-, and 600-yard) with a total of 60 firing positions, and assuming a maximum range of 7,000 yards, result in an area subject to bullet-caused wildfire of 2,559 acres, or 3.998 square miles. Of course, an errant bullet traveling outside the 20° SDZ cone would increase the area for a wildfire. See Figure 1 for a map showing the land area subject to wildfire from rifle bullets within the SDZ. See Attachment A for the calculations.

²⁹ *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting.* Michael E. Bussard and Stanton L. Wormley, Jr. 2006. pp 27-28. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.

³⁰ "line of fire" used in this paper is equivalent to "line of sight" from the NRA definition "an imaginary straight line from the eye through the sights of a firearm to the target" [*The Range Source Book*, National Rifle Association, 2023.]

³¹ Range Design Criteria. US Department of Energy. 6/4/2012. Available on line at: <http://www.hss.energy.gov>

Figure 1. Fire Hazard Severity Zone Map, Showing the Proposed Shooting Complex on Millville Plains Entirely within the Very High Fire Hazard Severity Zone.



- 4) Additional Factors Increasing the Risk of Wildfires from the Proposed Shooting Complex
 - As of February 16, 2025, all of the property planned for the gun range was upgraded from a HIGH to a VERY HIGH Wildland Fire Hazard Severity Zone (FHSZ) by the State Fire Marshall (see Figure 1).³² This zone classification is an immutable characteristic of the terrain, fire history, and weather, and cannot be mitigated by defensible space, maintenance, and any other human-caused actions.
 - According to CalFire, the Bascom Fire, which started in the immediate vicinity of the proposed gun range on June 23, 2018, burned 328 acres and was not contained until January 4, 2019: 195 days later.³³
 - The Cow Fire in Millville started as a grassland fire and took 7 days to put out. It was initiated by hot metal from a deteriorating catalytic converter from a passing motorist on California State Highway 44 on June 20, 2021.³⁴ It eventually burned 761 acres and was 100% contained June 26, 2021. Two structures were destroyed and one injury occurred.³⁵

5. Best Practices in the Design of a High-Powered Rifle Range

- a. The 2023 National Rifle Association (NRA) *Range Source Book* never uses the terms “Best Practices” when discussing design of rifle ranges (it does use the term “Best Management Practices” nine times relating to lead bullet reclamation), but instead lists several resources for the management of outdoor shooting ranges: “An ESP [Environmental Stewardship Plan] is a planning document for the sound environmental management of the shooting range. This planning focuses on the maintenance of the backstop and shot fall zones... The guidance documents from these organizations are mutually complimentary, and together constitute a complete package of guidance and recommendations for environmental management of outdoor shooting ranges consistent with national laws, regulations, and policies. ... Important resources for developing a site-specific ESP include:
 - 1) EPA-902-B-01-001...
 - 2) NSSF. 1997. Environmental Aspects of Construction and Management of Outdoor Shooting Ranges
 - 3) ITRC. 2005. Environmental Management at Operating Outdoor Small Arms Firing Ranges”³⁶
- b. Excerpts from ITRC 2005:³⁷

“The central task in formulating an environmental management plan is the selection and implementation of effective and reliable pollution prevention and mitigation measures,

³² <https://osfm.fire.ca.gov>; FHSZ Maps and Info; Office of the State Fire Marshal (OSFM), 715 P St., Sacramento CA 94244-2460; ©2025 State of California

³³ www.fire.ca.gov/incidents/2018/6/23/bascom-fire; and Redding Record Searchlight, June 23, 2018.

³⁴ Cal Fire News Release June 22, 2021.

³⁵ Cal Fire data from website www.fire.ca.gov.

³⁶ *The Range Source Book*. National Rifle Association Range Services. 11250 Waples Mill Road, Fairfax, VA 22030. 2023, p. 146. Note: on page 7, it is stated: “This source book supersedes the previous Range Manual publications produced by the National Rifle Association. Destroy previous publications.” As of June 12, 2025, the 2023 edition of the *Range Source Book* is the current edition.

³⁷ *Environmental Management at Operating Outdoor Small Arms Firing Ranges: Technical Guidance*. Interstate Technology Regulatory Council (ITRC). 50 F Street NW, Suite 350, Washington, DC 20001. February 2005.

otherwise referred to as ‘best management practices’ (BMPs). This document focuses on providing range operators with the guidance they need to identify and undertake BMPs that are appropriate for and tailored to the site-specific environmental conditions at their ranges.” (p. 1)

“The following questions help range operators collect and compile information necessary to adequately understand the characteristics of shot and bullet distribution ...

Where are the property boundaries, and do any rounds or shot fall beyond them?” (p. 7)

“The goal of the safety plan is to keep projectiles within a defined area. The range can then control the access to and use of that area.” (p.15)

“Bullet containment is extremely important not only for shooter/public safety reasons, but also metal recovery and containment to mitigate impacts to the environment. ... The selected containment system should be designed to meet site-specific training/shooting requirements, as well as available space for surface danger zone (SDZ), and address all of the environmental concerns. ... Bullets should be contained in the defined area of the range. ...

“An open range, with an earth berm and no overhead baffles, is the least expensive to build of all of the containment scenarios but has the largest SDZ and is the range layout most likely to have rounds leave the range proper. ...

“An engineering firm or other subject matter experts with range experience can provide assistance with new range construction or existing range upgrading, including calculation of the SDZ for the containment system selected. ...The need for the safety of range users, workers, and nearby residents greatly emphasizes the containment ...” (pp. 31-33)

c. Excerpts from NSSF³⁸:

“...sites for outdoor shooting ranges should be chosen that are safe for the environment, the surrounding community and range patrons. ... Initially, potential locations should be evaluated to exclude clearly inappropriate sites from consideration, such as sites ... too small for the proposed facility.” (p. 35)

d. The NRA Staff state “A bullet from an errant shot or a miss may fly several miles before it impacts the earth. A knowledge of maximum range (as well as what lies beyond the target area) can help a shooter assess whether it is or is not safe to fire.”³⁹

e. Ineffectiveness of the proposed downrange backstops

- 1) As noted above in documents referenced and recommended or produced by the NRA, berms alone cannot keep all rifle bullets within the defined area of an open range. The proposed shooting complex on Millville Plains is an open range. In addition to bullets going over the top of the berm, errant bullets could easily go to either side of the backstop berms. The proposed shooting complex has four rifle ranges: a 300-yard, 500-yard, 600-yard and a 1,000-yard range. Each range is designed with a dirt backstop 100 feet long and 20 feet high, with no side berms. The 300-, 500- and 600-yard ranges have a total of 60 firing positions. Assuming the three backstops each have 20 targets, then there would only be a few feet from

³⁸ *Environmental Aspects of Construction and Management of Outdoor Shooting Ranges*. National Shooting Sports Foundation, The Firearm Industry Trade Association; 11 Mile High Road, Newton, CT 06470

³⁹ “Gun Safety: Ammunition Maximum Range”, by NRA Staff, posted on November 7, 2019

the end targets to the outer edge of each backstop. Inadvertent movement of the rifle muzzle slightly to the side would then cause the bullet to miss the backstop.

- 2) It should be noted that the proposed shooting complex is sited on an almost level plain. Assuming the first shot on a 300-yard range hits the center of the target 4 feet above the bottom of the backstop, it is easily seen that by inadvertently raising the muzzle of an 18-inch rifle barrel only 5/16 inch, the next round will clear the top of the backstop. Likewise, by raising the barrel 5/32 inch will cause the bullet to go over the top of the backstop when firing on the 600-yard rifle range.

- f. It is clear that as a Best Practice, the only permanent safe solution to errant shot fall would be to have the rifle firing positions located far enough away from homes, businesses, and traffic so that the maximum range of any ammunition to be used on the shooting complex would not reach any homes, people, or vehicles.

6. Maximum Range of Popular Ammunition and Large Caliber Rifles

The following is a partial list of current ammunition with a maximum range capable of reaching California Highway 44 (a distance of 5,233 yards from the 60 rifle firing positions) and many homes and businesses. The NRA defines maximum range as the “Approximate maximum distance a bullet will travel to point of first impact with the ground at standard conditions with the muzzle elevated between 28 and 34 degrees.⁴⁰ The *NRA Firearms Sourcebook* lists standard and magnum rifle caliber ammunition, and states “Note that some military ammunition, special sporting ammunition and handloads may have greater flight distances than those listed.⁴¹

- a. .300 Winchester Magnum. “Americans simply love .300 Magnums, and among the lineup, the .300 Winchester Magnum has become the most popular choice.”⁴²

- 1) .300 Winchester Magnum 220 grain Sierra Match King has a maximum range of 6,994 yards⁴³
- 2) .300 Winchester Magnum 190 grain Sierra Match King has a maximum range of 6,577 yards.⁴⁴
- 3) .300 Winchester Magnum 180 grain commercial load has a maximum range of 5,312 yards⁴⁵

- b. The following commercial rifle ammunition is listed in the *NRA Firearms Sourcebook* with maximum range shown:⁴⁶

- 1) .338 Lapua Magnum, 250 grain: 7,000 yards
- 2) 7 mm Remington Magnum, 165 grain: 6,951 yards
- 3) .300 Remington SAUM (Short Action Ultra Magnum), 190 grain: 5,800 yards
- 4) .300 Weatherby Magnum, 180 grain: 5,800 yards
- 5) .300 WSM (Winchester Short Magnum), 180 grain: 5,700 yards
- 6) .257 Weatherby Magnum, 115 grain: 5,400 yards
- 7) .270 WSM (Winchester Short Magnum), 130 grain: 5,300 yards

⁴⁰ *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting.* Michael E. Bussard and Stanton L. Wormley, Jr. 2006. Page 26. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.

⁴¹ *Ibid.*

⁴² “Top 5 All-Around North American Big-Game Cartridges;” Phillip Massaro, *NRA American Hunter*, posted on November 8, 2021, AmericanHunter.org. National Rifle Association, 11250 Waples Mill Road, Fairfax, VA 22030.

⁴³ Ammunition available by hand load or on line (\$87/20). Maximum range from *Range Safety*, USA 385-63

⁴⁴ *Ibid.*

⁴⁵ *NRA Firearms Sourcebook. Your Ultimate Guide to Guns, Ballistics and Shooting.* Michael E. Bussard and Stanton L. Wormley, Jr. 2006. Page 28. National Rifle Association of America, 11250 Waples Mill Road, Fairfax, VA 22030-9400.

⁴⁶ *Ibid*

- c. .30-06. "...the 1906 design has certainly been getting it done in the hunting fields for well over a century."⁴⁷ Maximum range for the 200 grain bullet: 6,190 yards⁴⁸
- d. 450 Marlin. The .450 Marlin is listed by the NRA as having a maximum range of 7,000 yards.⁴⁹
- e. A southerly breeze on Millville Plains increases the distance a bullet will travel. Since the 300-, 500- and 600-yard rifle ranges all point essentially due north (the 300-yard range line of fire bears 000° T, the 500-yard line of fire bears 005° T, and the 600-yard range line of fire bears 006° T), a southerly breeze will provide a tailwind for the bullets. A thumb rule for wind-enhanced bullet distance is a .30 caliber bullet will travel 20 yards farther for every 1 mile per hour of tailwind speed.⁵⁰ For example, a 10 mph southerly breeze will cause a .30 caliber bullet to travel approximately 200 yards farther than with no wind.

7. Homes, Businesses, and Highway Within the Maximum Range

There are 97 homes and businesses, and 5½ miles of California State Highway 44 within 7,000 yards (the range of the .300 Winchester Magnum 220 grain, .450 Marlin, and .338 Lapua Magnum 250 grain) of the firing positions for the three (300-, 500- and 600-yard) rifle ranges. As noted above, there is a portion (650 yards long) of Highway 44 that is at a distance of 5,233 yards from the three rifle ranges, which is the closest Highway 44 is to the proposed rifle ranges.

- a. Table 3 (sorted by increasing distance) provides a list of the 97 homes and businesses within 7,000 yards of the (300-, 500- and 600-yard range) rifle firing positions. Table 4 shows the same information, sorted by address.⁵¹
- b. Figure 2 shows the three USGS topographic maps that were combined to depict the location of the proposed shooting complex and downrange area. Figure 2 may be found near the end of this paper, and is a half-size reduction (8½ inch x 11 inch) of the original USGS topographic maps. [To retain the highest-quality reproduction, Figure 2 may be provided as a separate electronic file to this paper. From this separate electronic file, an 11"x17" paper copy with all the detail of the original USGS topographic maps can be printed when the printer paper is set for 11x17", and can replace the half-size reduction image.] Locations of homes and roads built since 1965 are determined from Shasta County Map Viewer, Geographic Information Systems (GIS) Division, shastacounty.gov; and Google Maps Imagery, ©2023 Maxar Technologies.

⁴⁷ "Top 5 All-Around North American Big-Game Cartridges;" Phillip Massaro, *NRA American Hunter*, posted on November 8, 2021, AmericanHunter.org. National Rifle Association, 11250 Waples Mill Road, Fairfax, VA 22030.

⁴⁸ *NRA Firearms Sourcebook*. 2006. Page 27

⁴⁹ "Gun Safety: Ammunition Maximum Range", by NRA Staff, posted on November 7, 2019

⁵⁰ Range Safety. Department of the Army Pamphlet 385-63. 16 April 2014. Table 4-17, p. 42.

⁵¹ Address and range data determined and measured from Shasta County Map Viewer, Geographic Information Systems (GIS) Division, shastacounty.gov; and Google Maps Imagery, ©2023 Maxar Technologies

Table 3. Distance in Yards from Rifle Firing Positions to Homes and Businesses (Sorted by Distance)

	Address	Yards		Address	Yards
1	7447 Leopard Dr., Anderson	1716	50	23944 Hwy. 44, Millville	5947
2	7576 Bear Creek Way, Millville	2872	51	23932 Hwy. 44, Millville	5961
3	8095 Bear Creek Way, Millville	3664	52	23906 Hwy. 44, Millville	5961
4	24423 Bascom Rd., Millville	4260	53	25213 Hwy. 44, Millville	5961
5	24289 Bascom Rd., Millville	4275	54	24400 Old 44 Dr., Millville	6107
6	23991 Bascom Rd., Millville	4398	55	25000 Hwy. 44, Millville	6121
7	24561 Hwy. 44, Millville	4427	56	25241 Hwy. 44, Millville	6129
8	24288 Bascom Rd., Millville	4580	57	23848 Springwood Way, Millville	6143
9	8563 Bear Creek Way, Millville	4711	58	25147 S. Cow Creek Rd., Millville	6165
10	8232 Tompata Trl., Millville	4944	59	24524 Quail Terrace Ln., Millville	6165
11	24495 Hwy. 44, Millville	5067	60	23863 Deer Canyon Rd., Millville	6180
12	24609 Hwy. 44, Millville	5082	61	8605 Skylight Ridge Dr., Millville	6180
13	24185 Hwy. 44, Millville	5089	62	25100 Hwy. 44, Millville	6194
14	24325 Hwy. 44, Millville	5147	63	24530 Quail Terrace Ln., Millville	6194
15	24359 Hwy. 44, Millville	5191	64	8667 Oak Terrace Ln., Millville	6209
16	24403 Hwy. 44, Millville	5220	65	23653 Millville Way, Millville (Vet)	6216
17	24771 Hwy. 44, Millville	5242	66	25279 Hwy. 44, Millville	6230
18	24253 Hwy. 44, Millville	5249	67	25149 S. Cow Creek Rd., Millville	6230
19	24237 Hwy. 44, Millville	5263	68	24444 Old 44 Dr., Millville	6238
20	24219 Hwy. 44, Millville	5271	69	25281 Hwy. 44, Millville	6252
21	24801 Hwy. 44, Millville	5373	70	24708 Gypsy Moth Rd., Millville	6252
22	25025 Hwy. 44, Millville	5416	71	24691 Gypsy Moth Rd., Millville	6252
23	24887 Hwy. 44, Millville	5416	72	25002 Hwy. 44, Millville	6281
24	8500 Forevermore Dr., Millville	5460	73	24421 Old 44 Dr., Millville	6325
25	8504 Oak Terrace Ln., Millville	5489	74	23625 Millville Way, Millville	6325
26	24991 Hwy. 44, Millville	5503	75	23780 Springwood Way, Millville	6325
27	24510 Hwy. 44, Millville	5525	76	25150 S. Cow Creek Rd., Millville	6325
28	8600 Forevermore Dr., Millville	5547	77	23900 Sunnyslope Dr., Millville	6339
29	24140 Hwy. 44, Millville	5554	78	23662 Millville Way, Millville	6347
30	8519 Oak Terrace Ln., Millville	5583	79	24018 Deer Canyon Rd., Millville	6383
31	8556 Oak Terrace Ln., Millville	5612	80	23756 Springwood Way, Millville	6419
32	8615 Oak Terrace Ln., Millville	5642	81	23634 Millville Way, Millville	6434
33	8561 Oak Terrace Ln., Millville	5692	82	23606 Millville Way, Millville	6456
34	8574 Oak Terrace Ln., Millville	5729	83	8782 Hufford Way, Millville	6470
35	24326 Hwy. 44, Millville	5743	84	8764 Hufford Way, Millville	6470
36	24880 Hwy. 44, Millville	5743	85	8754 Hufford Way, Millville	6470
37	24900 Hwy. 44, Millville	5758	86	8718 Hufford Way, Millville	6470
38	25029 Hwy. 44, Millville	5765	87	8773 Hufford Way, Millville	6470
39	25151 Hwy. 44, Millville	5794	88	23703 Springwood Way, Millville	6507
40	8575 Oak Terrace Ln., Millville	5794	89	23950 Sunnyslope Dr., Millville	6528
41	24024 Hwy. 44, Millville	5801	90	24381 Old 44 Dr., Millville	6543
42	24522 Oswego Lake Rd., Millville	5816	91	23744 Springwood Way, Millville	6543
43	25195 Hwy. 44, Millville	5867	92	23694 Springwood Way, Millville	6565
44	8600 Oak Terrace Ln., Millville	5881	93	23712 Springwood Way, Millville	6565
45	24560 Oswego Lake Rd., Millville	5889	94	23720 Springwood Way, Millville	6565
46	24998 Hwy. 44, Millville	5903	95	23736 Springwood Way, Millville	6565
47	23972 Hwy. 44, Millville	5911	96	24370 Old 44 Dr., Millville	6579
48	25117 Hwy. 44, Millville	5911	97	25313 S. Cow Creek Rd., Millville	6797
49	8558 Skylight Ridge Dr., Millville	5925			

Table 4. Distance in Yards from Rifle Firing Positions to Homes and Businesses (Sorted by Address)

	Address	Yards		Address	Yards
1	23991 Bascom Rd., Millville	4398	51	25213 Hwy. 44, Millville	5961
2	24288 Bascom Rd., Millville	4580	52	25241 Hwy. 44, Millville	6129
3	24289 Bascom Rd., Millville	4275	53	25279 Hwy. 44, Millville	6230
4	24423 Bascom Rd., Millville	4260	54	25281 Hwy. 44, Millville	6252
5	7576 Bear Creek Way, Millville	2872	55	8718 Hufford Way, Millville	6470
6	8095 Bear Creek Way, Millville	3664	56	8754 Hufford Way, Millville	6470
7	8563 Bear Creek Way, Millville	4711	57	8764 Hufford Way, Millville	6470
8	25147 S. Cow Creek Rd., Millville	6165	58	8773 Hufford Way, Millville	6470
9	25149 S. Cow Creek Rd., Millville	6230	59	8782 Hufford Way, Millville	6470
10	25150 S. Cow Creek Rd., Millville	6325	60	7447 Leopard Dr., Anderson	1716
11	25313 S. Cow Creek Rd., Millville	6797	61	23606 Millville Way, Millville	6456
12	23863 Deer Canyon Rd., Millville	6180	62	23625 Millville Way, Millville	6325
13	24018 Deer Canyon Rd., Millville	6383	63	23634 Millville Way, Millville	6434
14	8500 Forevermore Dr., Millville	5460	64	23653 Millville Way, Millville (Vet)	6216
15	8600 Forevermore Dr., Millville	5547	65	23662 Millville Way, Millville	6347
16	24691 Gypsy Moth Rd., Millville	6252	66	8504 Oak Terrace Ln., Millville	5489
17	24708 Gypsy Moth Rd., Millville	6252	67	8519 Oak Terrace Ln., Millville	5583
18	23906 Hwy. 44, Millville	5961	68	8556 Oak Terrace Ln., Millville	5612
19	23932 Hwy. 44, Millville	5961	69	8561 Oak Terrace Ln., Millville	5692
20	23944 Hwy. 44, Millville	5947	70	8574 Oak Terrace Ln., Millville	5729
21	23972 Hwy. 44, Millville	5911	71	8575 Oak Terrace Ln., Millville	5794
22	24024 Hwy. 44, Millville	5801	72	8600 Oak Terrace Ln., Millville	5881
23	24140 Hwy. 44, Millville	5554	73	8615 Oak Terrace Ln., Millville	5642
24	24185 Hwy. 44, Millville	5089	74	8667 Oak Terrace Ln., Millville	6209
25	24219 Hwy. 44, Millville	5271	75	24370 Old 44 Dr., Millville	6579
26	24237 Hwy. 44, Millville	5263	76	24381 Old 44 Dr., Millville	6543
27	24253 Hwy. 44, Millville	5249	77	24400 Old 44 Dr., Millville	6107
28	24325 Hwy. 44, Millville	5147	78	24421 Old 44 Dr., Millville	6325
29	24326 Hwy. 44, Millville	5743	79	24444 Old 44 Dr., Millville	6238
30	24359 Hwy. 44, Millville	5191	80	24522 Oswego Lake Rd., Millville	5816
31	24403 Hwy. 44, Millville	5220	81	24560 Oswego Lake Rd., Millville	5889
32	24495 Hwy. 44, Millville	5067	82	24524 Quail Terrace Ln., Millville	6165
33	24510 Hwy. 44, Millville	5525	83	24530 Quail Terrace Ln., Millville	6194
34	24561 Hwy. 44, Millville	4427	84	8558 Skylight Ridge Dr., Millville	5925
35	24609 Hwy. 44, Millville	5082	85	8605 Skylight Ridge Dr., Millville	6180
36	24771 Hwy. 44, Millville	5242	86	23694 Springwood Way, Millville	6565
37	24801 Hwy. 44, Millville	5373	87	23703 Springwood Way, Millville	6507
38	24880 Hwy. 44, Millville	5743	88	23712 Springwood Way, Millville	6565
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40	24900 Hwy. 44, Millville	5758	90	23736 Springwood Way, Millville	6565
41	24991 Hwy. 44, Millville	5503	91	23744 Springwood Way, Millville	6543
42	24998 Hwy. 44, Millville	5903	92	23756 Springwood Way, Millville	6419
43	25000 Hwy. 44, Millville	6121	93	23780 Springwood Way, Millville	6325
44	25002 Hwy. 44, Millville	6281	94	23848 Springwood Way, Millville	6143
45	25025 Hwy. 44, Millville	5416	95	23900 Sunnyslope Dr., Millville	6339
46	25029 Hwy. 44, Millville	5765	96	23950 Sunnyslope Dr., Millville	6528
47	25100 Hwy. 44, Millville	6194	97	8232 Tompata Trl., Millville	4944
48	25117 Hwy. 44, Millville	5911			
49	25151 Hwy. 44, Millville	5794			
50	25195 Hwy. 44, Millville	5867			

- c. Averaging the Ahead AADT (Annual Average Daily Traffic) and the Back AADT on Highway 44 at Millville Plains Road, there was a traffic volume of 5,500 vehicles per day in 2017.⁵² California Highway 44, as noted above, has 5½ miles of road surface within 7,000 yards of the three rifle ranges. Likewise, 2.6 miles of Highway 44 are within 5,800 yards, or in range of eight of the popular rifle ammunition listed above. Note that this is not a complete list.
8. Planning for Safety
- a. From the 2023 *NRA Range Source Book*
 “ENGINEER the range specifically to accommodate the chosen shooting activity. The use of the range facility outside its design limits violates accepted engineering practices and breeches the basic concept of a safety plan.”⁵³
 - b. Engineering Controls vs. Administrative Controls
 Within the realm of industrial safety, there is a hierarchy of controls to protect people from hazards. Engineering controls are always considered more effective than administrative controls. “Engineering Controls – Isolate people from the hazard; Administrative Controls – Change the way people work.”⁵⁴
 An example of an administrative control would be to teach your children to not play with firearms. An engineering control would be to securely lock those firearms in a safe. The administrative control requires constant vigilance; the engineering control is a built-in control that requires no supervision.
 For a rifle range, engineering controls would be to site the range either with a mountain as the background or in a desert or similar location where there is no human habitation or travel within the maximum range of the ammunition to be used on the range.
9. Danger from Falling Bullets to People, Livestock, Outdoor Propane Tanks, and High Voltage Lines
- a. “Falling bullets or gravitational bullets are the ones that move under the effect of gravity force after the muzzle force diminished....the movement of the bullets will change to downward and their velocities will be accelerated by the effect of the gravity until the air resistance drag equalizes the effect of the gravity so the bullets will reach the terminal constant velocity....bullets travelling at 200 ft/sec can penetrate the skull.”⁵⁵
 - b. .30 caliber rounds reach terminal velocity of 300 feet/second.⁵⁶
 - c. “Experimental results found for an upwards fired 7.62 mm bullet terminal velocity is about 90 m/s [295, or approximately 300 ft/sec]...The typical terminal velocities given in literature for spent bullets are from 300 fps to 600 fps...In many simulated cases through the launch angle region the bullet possessed the estimated minimum lethal energy 40 J [40 joules, or 29.5 ft/lbs] at the end of trajectory. The skull penetrating speed 60 m/s [197

⁵² DOT.CA.GOV, 2017 Traffic Volumes: Route 44 at Millville Plains Road

⁵³ *The Range Source Book*. NRA Range Services. 11250 Waples Mill Road, Fairfax, VA 22030. 2023, p. 34

⁵⁴ “Identifying Hazard Control Options: The Hierarchy of Controls.” <https://osha.gov/safety-management>

⁵⁵ Abdali, H.A., et al. “Cranial Gravitational (Falling) Bullet Injuries: Point of View.” *Journal of Neurosciences in Rural Practice*. 2018 Apr-Jun; 9(2): 278-280. From the National Institutes of Health database.

⁵⁶ Hatcher’s Notebook. J.S. Hatcher. 1947

ft/sec] was mostly clearly exceeded. A preliminary value for shooter-centered danger zone diameter obtained was found to be approximately 8 km [8,749 yards].⁵⁷

- d. From this data we can conclude that any large-caliber rifle bullet that travels outside the proposed shooting complex will have sufficient velocity to penetrate the human skull when it falls to earth.
- e. In addition to the danger to humans (residents of homes in range, clients and staff of the Millville Veterinary Clinic, Parishioners of Millville Community Baptist Church, etc.), and in addition to danger to livestock, errant shot fall presents a significant hazard to the large (250-gallon, 500-gallon, and larger) outdoor propane tanks used by most of the rural homes and businesses within rifle range. For example, a 500-gallon propane tank has a shell thickness of 0.218 inches, and a head thickness of 0.185 inches steel⁵⁸, with exterior shut-off valve(s), a pressure reducing valve, and related tubing made of bronze and copper that could be penetrated or shorn off by an errant bullet, causing a propane leak. High voltage transmission lines also cross into the errant shot fall zone of the 300-, 500- and 600-yard rifle ranges, as noted previously.

10. Scope of the Shooting Complex

Note: This accounting of firing ranges and shooting positions does not include the 3 law enforcement pistol ranges (two 25-yard and one 50-yard range) within their fenced enclosure.

- a. Firing ranges and number of shooting positions

The below table lists the firing ranges and number of firing positions for each, as shown on the Conceptual Plan.

Number and Type of Firing Ranges

Firing Range	Number of Positions
25 Yard Pistol	45
50 Yard Pistol	25
300-, 500-, and 600- Yard Rifle	60
1,000 Yard Rifle	1
Shotgun (Skeet)	21
Shotgun (Trap)	8
Total	160

⁵⁷ Saileranta, T., et al. "Upwards Fired Bullet Terminal Velocity." 27th International Symposium on Ballistics, Freiburg, Germany, April 22-26, 2013.

⁵⁸ The American Society of Mechanical Engineers (ASME) specification.

11. Summary and Conclusion

a. Key Points

- The proposed gun range property lies entirely within a VERY HIGH Wildland Fire Hazard Severity Zone. This zone classification is an immutable characteristic of the terrain, fire history, and weather, and cannot be mitigated by defensible space, maintenance, and any other human-caused actions.
- Shooting-caused wildfires can initiate within an area of 2,559 acres (3.998 square miles) and over 4 miles from the 60 rifle firing positions, where 60 shooters could be firing at the same time.
- Defensible space and a fire suppression system at the clubhouse and firing line of the proposed gun range will not prevent or reduce the severity of wildfires caused by errant rifle bullets
- Rate of wildfire advance on grassland is 20% of wind speed
- On a non-Red Flag Warning Day, a grass fire on Millville Plains could advance at 2 mph
- The Bascom Fire, which started in the immediate vicinity of the proposed shooting complex on June 23, 2018, burned 328 acres and was not contained until January 4, 2019: 195 days later
- Steel or copper bullets are recognized as a primary source of gun range-caused fires: 1400° F fragments. Compare this to fireworks fragments at 1200° F, illegal in Shasta County since 1934.
- Only steel or copper-jacketed steel bullets are allowed on the proposed rifle ranges
- 257 shooting-caused fires in California, excluding those caused by incendiary ammunition or exploding targets from 2012 to 2022, burning a total of 25,625 acres.
- 753 wildfires reported in 11 western states caused by shooting at inert targets from 1992-2018
- Ten PG&E 500,000 volt towers, 41 lesser-voltage towers, and 2.2 miles of high-voltage lines cross directly into the line of fire from 60 rifle firing positions
- A hunter’s stray rifle bullet brought down a power line sparking a brush fire in Bern Township, Pennsylvania, on Dec. 3, 2013
- 97 homes and businesses and 5½ miles of CA Highway 44 (with 5,500 vehicles/day) are in range of errant rifle bullets
- Any bullet that leaves the gun range has sufficient velocity to penetrate the human skull

b. Environmental Checklist Form – Environmental Impact Report

Appendix G of the CEQA Guidelines, the Environmental Checklist Form, was included in the previous IS/MND. Based on the information provided in this paper. The following changes relating to hazards and wildfire should be made to any future Environmental Impact Report:

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED: The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact” as indicated by the checklist on the following pages.

X	Hazards and Hazardous Materials
X	Wildfire
X	Mandatory Findings of Significance

IX. HAZARDS AND HAZARDOUS MATERIALS: Would the project:	Potentially Significant Impact	Less-Than-Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	X			

As explained in Section 4 of this paper, an outdoor gun range on Millville Plains, if constructed and operating, will increase the likelihood and severity of wildfires. No mitigation is possible, as errant rifle bullets could cause a spark, initiating a wildfire, over areas of 2,559 acres or more. Note that a bullet landing on the north side of California Highway 44 could start a wildfire, 4 miles from the shooter, as the area is generally very rocky and consists primarily of tall dry grass in the dry season.

XX. WILDFIRE: If located in or near state responsibility areas or lands classified as very high fire severity zones, would the project:	Potentially Significant Impact	Less-Than-Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	X			

The same explanation for Issue IX above applies.

XXI. MANDATORY FINDINGS OF SIGNIFICANCE:	Potentially Significant Impact	Less-Than-Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below the self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	X			
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	X			

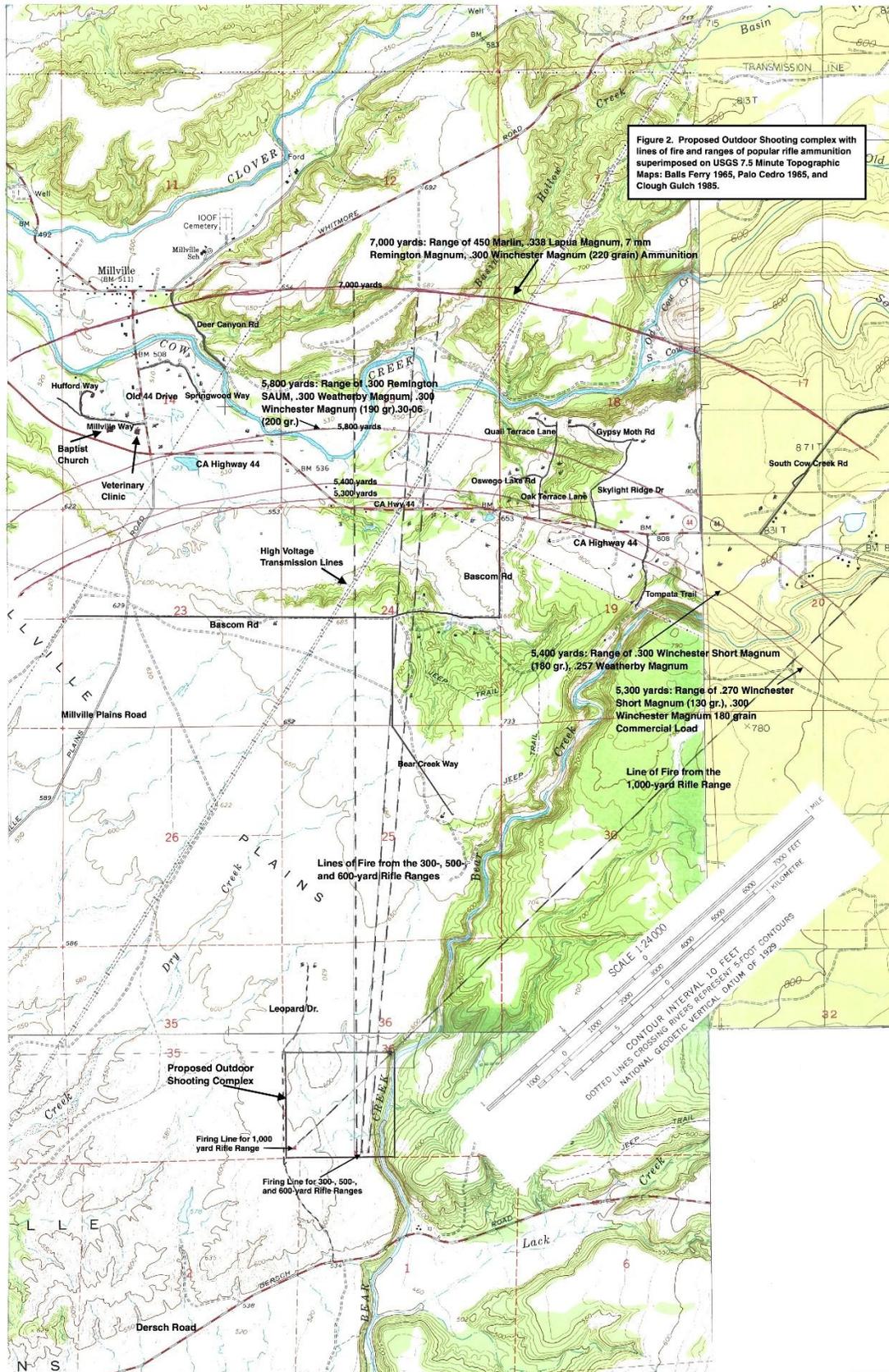
As wildfires substantially degrade the quality of the environment, Mandatory Finding of Significance a) is a potentially significant impact. Likewise, Mandatory Finding of Significance c) is a potentially significant impact due to: 1) the potential for wildfires, and 2) the possibility of errant rifle bullets impacting 97 homes and businesses, residents, and the traveling public on California Highway 44.

c. Conclusion

The proposed gun range on Millville Plains, if constructed and operating, would become an engine for wildland fire creation, significantly increasing the number and severity of wildfires. The livelihood of the communities of Northern California and the traveling public would be in constant peril, both from wildfires and errant rifle bullets threatening 97 homes and businesses and 5½ miles of California Highway 44.

For further information see www.stopmillvillegunrange.com.

Figure 2. Map of Proposed Shooting Complex with Lines of Fire and Ranges of Popular Rifle Ammunition



Attachment A. Area Subject to Shooting-caused Wildfires at Various Rifle Bullet Impact Distances:
Calculations

Given:

- Bullet impact distances of 3750 yards, 4475 yards, 7000 yards, and 4 miles
- Firing line widths for 300-, 500- and 600-yard rifle ranges of 100 feet each, with distance between 300-yard range and 500 yard range= 112 feet, and distance between 500 yard range and 600 yard range=34 feet; all for a total firing line range width of 446 feet.⁵⁹
- Line of fire for the western-most rifle range (300 yard range) is 000° True; line of fire for the eastern-most rifle range (600-yard range) is 006° True.
- Bullet impact area is 5° on either side of line of fire, and ricochet area is an additional 5° on either side of line of fire, for a total impact cone of 20° arc from a single shooter. Total impact area (see diagram below) for the 3 rifle ranges includes the firing line range width with 10° on the left line of fire (000° T) and 10° on the right line of fire (006° T).⁶⁰

Find:

- Area subject to wildfires caused by bullet impact for 1 rifle shooter from each of the bullet ranges given in a) above
- Area subject to wildfires caused by bullet impact for the entire rifle range width given in d) above, for a bullet impact distance of 7000 yards

Calculations

- Area subject to wildfires from a single rifle bullet is given by :

$$\left(\frac{\text{area of circle in sq. ft.} = \pi r^2}{1} \right) \left(\frac{20^\circ}{360^\circ} \right) \left(\frac{\text{acre}}{43560 \text{ sq. ft.}} \right)$$

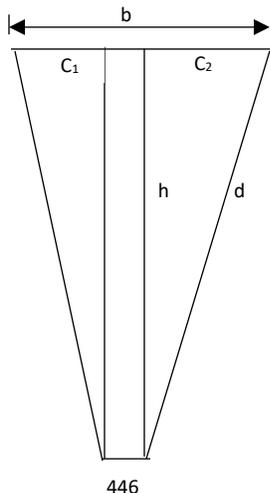
Where radius r= range of rifle bullet, then:

Rifle Bullet Range

3750 yards (standard ammunition) = 11,250 ft
 4475 yards (magnum ammunition) = 13,425 ft
 7000 yards = 21,000 ft
 4 miles = 21,120 ft

Area Subject to Wildfire

507 acres = 0.79 square miles
722 acres = 1.13 square miles
1767 acres = 2.76 square miles
1787 acres = 2.79 square miles



- Area subject to wildfires from the 3 rifle ranges (300-, 500-, and 600-yard rifle ranges) is a trapezoid. Bullet distance = 7000 yards. Area of trapezoid = ½ (a+b)h; leg a=446', leg b= a+c₁+c₂, with c₁ or c₂ = one leg of triangle hcd, with d the hypotenuse. Distance h= 7000 yards = 21,000'
 c₁ = (TAN 10°)(h) = 3703 ft.
 c₂ = (TAN 16°)(h) = 6022 ft.
 Parallel leg b of trapezoid = 3703' + 446' + 6022' = 10,171'
 Area of trapezoid = ½(446'+10,171')(21,000') = 111,478,500 sq. ft.
Area subject to wildfires from the three rifle ranges
= 2,559 acres
= 3.998 square miles ≈ 4 square miles

⁵⁹ Site Plan, High Plains Shooting Sports Center, Butler Engineering, Sheet C-1 Revision 3; 3/29/2023

⁶⁰ Range Design Criteria, U.S. Department of Energy. 6/4/2012. Attachment 1-2, Figure 1.