Appendix F
Noise Technical Report

California Department of Food and Agriculture/ Wildlife Services California Wildlife Damage Management Project

Noise Technical Report

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Acronyms and Abbreviations

Acronym/Abbreviation	Meaning
ANSI	American National Standards Institute
APHIS	Animal Plant Health Inspection Service, a Division of the USDA
AUF	acoustical usage factor
CDFA or Department	California Department of Food and Agriculture
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	community noise equivalent level
dB	Decibel
dBA	A-weighted decibel
d_{ref}	The reference distance that helps define Leq (activity)
FAA	Federal Aviation Administration
FTA	Federal Transit Administration
HUD	U.S. Department of Housing and Urban Development
Hz	Hertz
IPM	Integrated Pest Management
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
L_{min}	minimum sound level
L_v	vibration level
L_{xx}	percentile-exceeded sound levels
NSLU	noise-sensitive land use
OSHA	Occupational Safety and Health Act
PPV	peak particle velocity
Program or Statewide Program	The California Department of Food and Agriculture's (CDFA's) Statewide Wildlife Damage Management Program; the portion of the joint federal/ state Project proposed by CDFA and the Counties
Project or Proposed Project	Proposed joint state (CDFA and Counties)/federal (WS-California) Wildlife Damage Management Project
RMS	root mean square
SPL	sound pressure level (or sound level) as measured by a sound level meter
USC	United States Code
USDA	United States Department of Agriculture
WDM	Wildlife Damage Management
WHO	World Health Organization
WS-California	Wildlife Services Division of the USDA APHIS within the state of California

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1 Introduction

1.1 Project Overview

The California Department of Food and Agriculture (CDFA) and Wildlife Services-California (WS-California), a state office within the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), are preparing a joint Environmental Impact Report/Environmental Impact Statement (EIR/EIS) to provide a robust and comprehensive environmental analysis of current and proposed wildlife damage management (WDM) activities performed in California by CDFA and California Counties (Counties), as required by the California Environmental Quality Act (CEQA), and by WS-California, as required by the National Environmental Policy Act (NEPA). These activities would be undertaken in a coordinated effort to prevent damage to agricultural resources and property, protect natural resources, and promote human health and safety.

1.2 Project Description

The CDFA's proposed Wildlife Damage Management Program (Program) describes and formalizes a framework for managing damage caused by wildlife determined to be injurious to California's agricultural industry. This EIR/EIS provides a statewide environmental analysis of the framework to inform decision makers and the general public about the potential impacts of existing and future WDM activities that would be considered under the Program. Activities within this framework would be carried out in a collaborative effort with Counties and WS-California, and in collaboration and consultation with other federal, state, and local agencies as appropriate. All activities to be conducted under the framework will be analyzed in and informed by the EIR/EIS.

WS-California provides federal leadership and expertise in managing wildlife conflicts in California.[1] WS-California uses an integrated approach to recommend and apply a comprehensive range of legally available nonlethal and lethal techniques for reducing wildlife damage and conflicts. This includes providing advice on wildlife damage prevention and management, information on sources of WDM materials, depredation investigations, equipment loans, training on the use of WDM methods, and assistance with implementation of WDM methods. WS-California conducts these activities both independently and jointly with federal and state agencies, counties, municipalities, Native American Tribes, and private landowners/managers.

When considering the activities of both CDFA and WS-California altogether, the term "Proposed Project" or "Project" shall be used. This EIR/EIS analyzes the Proposed Project framework and activities undertaken to manage damage caused by wildlife throughout California by WS-California, CDFA, and Counties.

The nature of these independent and collaborative activities is not a finite set of predictable actions in specific locations, but rather, as a process of responding to and minimizing damage caused by wildlife, which is inherently unpredictable both spatially and temporally. For each reported incident of wildlife damage, this process involves investigation of the damage, review of available methods, implementation of chosen methods, monitoring effectiveness of the methods, and adaptive management as necessary. CDFA and WS-California share a commitment to a common decision-making process, which protects public safety, upholds the Public Trust

[1] There are Wildlife Services (WS) offices representing all 50 states, the District of Columbia, Guam, and the Virgin Islands.

Doctrine,[2] utilizes non-lethal methods to minimize or resolve wildlife conflicts when possible, protects natural resources, and humanely dispatches animals that are lethally taken.

WDM has been a cooperative activity between the federal government and Counties since 1919 and between the State of California and USDA since 1921.[3] Between 1921 and 2003, WS-California (and its predecessor agencies within the federal government) and CDFA (and its predecessor the California Department of Agriculture) partnered with Counties, agricultural extension offices, farmers, ranchers, and other agriculturalists to jointly conduct WDM activities and/or share the cost of WDM activities.[4]

In 2003, CDFA ceased to fund and actively conduct WDM activities. Since that time, requests for WDM assistance from the public (primarily land and resource owners/managers), , other agencies and governmental bodies, and Native American Tribes in California have been addressed by the individual counties, WS-California, private entities/firms, or have not been addressed.

The current range of WDM approaches that Counties take include the following:

- **No-County-Provided WDM.** No WDM activities are provided by these counties. Some of these counties have historically contracted with WS-California (and historic data is available) and some have expressed interest in participating in a statewide program if it were available.
- **County-Led WDM.** These counties include a variety of program approach types including but not limited to the following: (1) Programs that focus on addressing agricultural damage (e.g., activities including technical assistance up to operational support), preventing property damage, and securing public safety, (2) Programs that coordinate/share WDM responsibilities with animal control and/or other County departments, (3) Grant programs that focus on nonlethal pest management practices, including reimbursement, and (4) Programs where the counties contract directly with private entities for WDM.
- **WS/County Cooperative WDM.** Many counties in California have an existing Cooperative Service Agreement (CSA) with WS-California to conduct WDM activities on individual counties' behalf.

1.2.1 CDFA's Wildlife Damage Management

The CDFA is mandated to "promote and protect the agricultural industry of the state."[5] This responsibility encompasses the prevention of wildlife damage to agriculture, including crops, livestock, and various agricultural and public infrastructure (e.g., roads, water conveyance structures, and buildings). As part of this mandate, CDFA must prevent the introduction and spread of any insects or animals that are dangerous or detrimental to California's

2 Martin v. Waddell, 41 U.S. 367 (1842) – this Supreme Court decision serves as the groundwork in U.S. common law that wildlife resources are owned by no one, to be held in trust by government for the benefit of present and future generations.

3 Karabian, W., October 20, 1970. *Animal Damage Control Activities in California*. Submitted to the California Legislature and the California Department of Agriculture, Requested and in Accordance with Concurrent Resolution No. 110 and Joint Resolution No 31.

4 The historic animal damage control program in California was accomplished under a master agreement between CDFA, Counties, and the U.S. Bureau of Sports Fisheries and Wildlife (now WS-California). Financing was also shared by county, state, and federal jurisdictions (*Report to the 1971 Legislature on Predatory Animal Damage Control Activities in California Including Wildlife Rabies Control*, State of California Agriculture and Services Agency Department of Agriculture and Human Relations Agency Department of Public Health, January 15, 1971).

5 California Food and Agriculture Code (FAC) § 401.

agricultural industry.[6] The CDFA is also authorized to employ "hunters and trappers" to manage and eradicate harmful predatory animals.[7]

The CDFA's responsibilities encompass the prevention of wildlife damage to agriculture, including injury to or death of livestock; damage to row crops, orchards, forestry/timber plantations, or vineyards; and harm to the structural integrity of roads, buildings, irrigation and other water conveyance structures, and other agricultural infrastructure. In addition to the benefits provided to agriculture, WDM activities provide benefits to natural resources (including watercourses and rare, sensitive, and protected species), public infrastructure and private property, and public health and safety. Injurious wildlife includes numerous mammals, bird, reptile, amphibian, and fish species.

California has a "unique system" of County Agricultural Commissioners, and the Legislature has specified that where CDFA and County Agricultural Commissioners have joint responsibilities, wildlife damage management is performed at the County level by County Agricultural Commissioners while the CDFA primarily serves in an oversight and support capacity by providing data and issuing recommendations and policies. Counties may also work directly with WS-California through a CSA. The CDFA may also participate in "rapid response" activities, both independently and in collaboration with Counties and WS-California, to respond to high-risk, wildlife damage scenarios (e.g., introduction and spread of injurious animal pests, need to exclude high-risk pests) to promptly abate and prevent harm to agricultural and natural resources, to protect property and infrastructure, and to ensure human health and safety.

CEQA and NEPA have similar goals regarding projects that may affect the environment, and CEQA is generally recognized as having a broader reach and impact than NEPA. CEQA is both procedural and substantive, while NEPA is largely procedural. CEQA requires CDFA and participating counties to assess the potential environmental impacts of their WDM activities, and to mitigate significant impacts, as practicable. NEPA requires WS-California to consider the potential environmental impacts of its WDM activities and to identify feasible alternatives.

In compliance with CEQA and NEPA, the EIR/EIS will provide state and federal environmental review for WDM activities conducted in California by CDFA, the Counties, and WS-California. This will include a description of the process for consideration of future WDM activities (that have not been included in the EIR/EIS). CDFA will also monitor the subsequent use of the EIR by Counties or other state agencies to ensure consistency with the impact conclusions and mitigation measures defined herein.

The CDFA will not need new legislation to formalize and implement the Program; its existing authorities are sufficient. The Program would establish a statewide framework for managing wildlife determined to be injurious to California's agricultural resources and property, natural resources, and/or human health and safety. The activities to be conducted under the Program framework are well established and historically have been carried out by CDFA, Counties, and WS-California. This framework would be refined through ongoing coordination to improve its efficacy, particularly with respect to interagency coordination, data collection and processing, information sharing, and education. The Program's elements are described, as follows.

The Program framework would preserve and enhance the Counties' historical roles in carrying out WDM activities at the local level, with CDFA primarily serving in an oversight and support capacity. CDFA would also coordinate with

6 FAC §§ 403, 461, 5006.
7 FAC § 11221.

the Counties, WS-California, and other state agencies to undertake rapid responses to high-risk wildlife damage threats. In undertaking these rapid response activities, CDFA recognizes that Counties are well equipped to act quickly in response to damage, conflicts, or threats by wildlife to agricultural and natural resources.[8] Nonetheless, in situations where a wildlife species can quickly cause severe and extensive damage, CDFA must have the ability to provide the rapid regional response needed to effectively manage, remove, and/or eradicate such a threat.

This imperative was struck in bold relief when, in 2017, a pregnant female nutria (*Myocastor coypus)* was captured in Merced County by a WS-California employee. A semi-aquatic rodent, nutria consume up to 25 percent of their body weight in above- and below-ground plant material each day, causing extensive damage to native plant communities, soil structures, and agricultural crops. Aside from damaging agriculture, nutria impact public infrastructure by burrowing into banks and levees, causing streambank erosion, sedimentation, levee failures, and roadbed collapses that threaten public safety. Nutria were last detected in California in the early 1970s, which prompted the initiation of a joint program among CDFA, the California Department of Fish and Wildlife (CDFW), WS-California, and Counties to eradicate the species because of its devastating impacts on agriculture, wetlands, and water infrastructure.

A comprehensive statewide environmental analysis of the Program will improve the efficacy of WDM and rapid response (e.g., targeted removal of invasive species, like nutria) in California.

1.2.1.1 Proposed CDFA Wildlife Damage Management Program

The proposed Program would be consistent with CDFA's legislative mandates and would reestablish the framework for undertaking WDM activities that protect California's agricultural resources and property, promote human health and safety, and protect natural resources. The framework for the Program is provided by existing law, and two of the three principal governmental entities operating within this framework – the Counties and WS-California – have worked together continuously for many decades and enjoy well-developed administrative practices for coordination and collaboration. The CDFA's reengagement with those entities, as well as other state and local agencies, through the Program would involve reestablishing lines of communication needed for coordination and collaboration among all parties. An overview of the Program, objectives, and architecture (functional elements, involving both intra-and intergovernmental coordination and cooperation) is provided, as follows.

Program Components

Two broad categories of WDM activities make up the Program:

- CDFA-Led Activities
- CDFA/County Activities

The CDFA-Led Activities are those WDM activities over which CDFA exercises primary responsibility. This includes rapid response activities. Other examples include any statewide administrative activities, such as maintenance of the CEQA/NEPA document, and development of statewide WDM recommendations in collaboration with WS-California, CDFW and/or other state agencies. In addition, this may include creation and administration of statewide advisory groups and support of County CEQA compliance. This is especially helpful in situations where there is a need for consistent guidance applicable to more than one County (e.g., to address a regional issue that

[8] FAC § 2276.5.

may span several counties). CDFA would coordinate and partner with the California Agricultural Commissioners and Sealers Association (CACASA) to ensure coordinated and complete communications with all California County Agricultural Commissioners.

The CDFA/County Activities are those WDM activities primarily executed or organized by counties. These would be conducted in coordination with CDFA. Most WDM activities would continue to fall into this broad category. Within this category of activities, participating counties may carry out WDM activities on their own (County-Led WDM) or enter into a CSA with WS-California (WS/County Cooperative WDM).

The counties would typically have a role in both categories, whereas other state and local agencies would sometimes be involved in one or both, to a greater or lesser degree. There would also be situations in which a County could take WDM action on its own, independent of either CDFA or WS-California. (There would also be situations in which WS-California could take WDM action on its own, independent of either CDFA or a County, as discussed in the WS-California Wildlife Damage Management section).

It is not CDFA's intention that the Program's formalization of the existing framework for WDM would give rise to any new interactions between or situations involving CDFA, WS-California, and/or the Counties that did not occur prior to 2003, when CDFA's role in WDM lapsed. Activities within this framework would be carried out in a coordinated effort with Counties and WS-California, with collaboration and consultation from other federal, state, and local agencies as appropriate. The CDFA and WS-California would follow the historic division of labor and responsibility with respect to WDM by conducting independent, parallel activities within each agency, usually in collaboration with the Counties, as well as coordinating and collaborating with each other on common or joint activities.

Activities undertaken by WS-California independently or in coordination with Counties are described in the "WS-California Wildlife Damage Management" section, as follows.

1.2.2 WS-California Wildlife Damage Management

Background

Under federal law, the U.S. Secretary of Agriculture (Secretary) is authorized to conduct a program of wildlife services with respect to injurious animal species and take any action the Secretary deems necessary in conducting the program. The Secretary has delegated this authority to APHIS Wildlife Services. The Secretary is further authorized to enter into agreements with states, local jurisdictions, individuals, and public and private organizations and institutions for the control of nuisance mammals (except for urban rodent control) and birds, and those mammal and bird species that are reservoirs of zoonotic diseases.

WS-California performs the functions delegated to USDA, APHIS, and WS within the State of California. WS-California is authorized to enter into CSAs with Counties, state and federal agencies, environmental groups, and private and public groups to perform WDM activities for the protection of agriculture, property, natural resources, and human health and safety.

Overview

WS-California provides federal leadership and expertise in managing wildlife conflicts in California to allow people and wildlife to coexist. WS-California currently uses an integrated approach to recommend and apply a range of legally available nonlethal and lethal techniques for reducing wildlife damage and conflicts.

WS-California provides information, guidance, training, and operational assistance on wildlife damage prevention and management. WS-California receives requests for assistance from the public, private entities, other agencies or governmental bodies, and Native American tribes. Assistance may include demonstrations on the proper use of management devices and information and advice on animal husbandry practices, habitat management, and animal behavior modification devices, among other topics. Part of the decision-making process includes an on-site visit or verbal consultation with the requestor. Potential methods used as part of WDM can include physical exclusion, harassment and deterrence, capture devices, and in some cases, lethal techniques. A description of methods used by WS-California are summarized in the following section. The potential for substantial noise or vibration to be generated as a result of the use of these methods or management techniques is also described.

WS-California Wildlife Damage Management Approach

WS-California uses an integrated WDM approach that is intended to:

- Implement standardized procedures for evaluating complaints of wildlife damage, implementing management strategies, and conducting monitoring to evaluate the effectiveness of management strategies.
- Utilize USDA/APHIS/WS national directives, United States Fish and Wildlife Service (USFWS) Biological Opinions of WS actions, and WS-California policies to support the development and implementation of measures to avoid, minimize, and mitigate impacts to California's wildlife, natural resources, property, human life, threatened and endangered species, and natural habitats from WDM materials, technologies, and methods.
- Build upon existing resources, including WS-California's data reporting system, to develop a statewide information management, reporting, and data sharing system for wildlife damage incidents and management recommendations that will allow a robust evaluation of all WDM activities to support an integrated and adaptive management approach.

Functional Elements of WS-California's Activities

WS-California's WDM activities include the following functional elements in support of WS's mission to protect agriculture, property, natural resources, and human health and safety.

- **Cooperative Resource Protection.** WS-California is authorized to enter into CSAs with Counties and land/resource owners/managers to implement activities that resolve or minimize wildlife damage impacting agriculture and property (including infrastructure). WS-California provides WDM services under these agreements, including technical assistance (including education and advice), and implementation of WDM methods (including the deployment of trained personnel and specialized equipment).
- **Airport Wildlife Hazard Management.** WS-California conducts WDM as part of APHIS' Airport Wildlife Hazards Program to resolve wildlife conflicts that threaten the flying public's health and safety. WS-California employs a network of trained and certified biologists and technicians that provide site visits and

consultations, develop wildlife hazard assessments and wildlife hazard management plans, and conduct operational WDM on airfields. This work helps airport managers maintain a safe environment and meet Federal Aviation Administration regulatory requirements and Department of Defense instructions.

- **Threatened and Endangered Species Protection.** WS-California works in collaboration with USFWS, CDFW, conservation organizations, and other land/resource managers to protect threatened and endangered wildlife and plants from the impacts of predation, destruction, invasive species, and disease.
- **Human Health and Safety.** In addition to airport wildlife hazard management, WS-California conducts WDM activities in protection of human health and safety at the request of CDFW, law enforcement, and/or public health agencies. These activities include responding to wildlife bite/attack incidents and situations that pose a disease risk to humans (e.g., zoonotic diseases and food contamination).
- **Invasive Species.** WS-California collaborates with USFWS, CDFA, CDFW, conservation organizations, and other land/resource owners to implement WDM activities to control the spread of invasive species and mitigate the impacts to California's ecosystems, native wildlife, and other resources.

Indirect/Nonlethal Control Methods

Resource Management/Habitat Modification

WS-California wildlife specialists may recommend resource management/habitat modification techniques that include a variety of practices that may be used by agriculture producers to reduce their exposure to potential wildlife depredation losses. Wildlife production and/or presence are often directly related to the type, quality, and quantity of suitable habitat. Implementation of resource management/habitat modification practices is appropriate when the potential for depredation can be reduced without significantly increasing the cost of production or diminishing the resource owner's ability to achieve land management and production goals. WS-California may recommend or be consulted on techniques to lessen or avoid damage, however the property owner is responsible for evaluating and implementing resource management and habitat modifications techniques. From a noise and vibration perspective, implementation of resource management and habitat modification techniques would not be anticipated to alter existing noise or vibration patterns on agricultural lands throughout California.

Animal Husbandry

This general category includes modifications in the level of care and attention given to livestock, shifts in the timing of breeding and births, changing in herding techniques, livestock species selection, and the use of human or animal guards (e.g., dogs, donkeys, and llamas) to protect livestock. WS-California wildlife specialists may recommend individual methods or a combination of techniques in order to increase protection of livestock from wildlife predation. The level of care or attention given to livestock may range from daily to seasonal. Generally, as the frequency and intensity of livestock handling increases, so does the degree of protection. In operations where livestock are left unattended for extended periods, the risk of depredation is greatest. The risk of depredation can be reduced when operations permit nightly gathering so that livestock are inaccessible during the hours when predators are most active. From a noise and vibration perspective, changes to animal husbandry would not be anticipated to alter existing noise or vibration patterns for existing livestock handling on agricultural lands throughout California.

Modification of Human Behavior

Many wildlife species adapt well to human settlements and activities, but their proximity to humans may result in damage to structures or threats to public health and safety. WS-California wildlife specialists may recommend alteration of human behavior to resolve potential conflicts between humans and wildlife. For example, eliminating wildlife feeding and handling can reduce potential problems, but many people who are not directly affected by problems caused by wildlife enjoy wild animals and engage in activities that encourage their presence. It is difficult to consistently enforce no-feeding regulations and effectively educate all people concerning the potential liabilities of feeding wildlife. Other examples of modifying human behavior could include altering activity periods and walking in groups. Changes in human behavior that are centered on the discontinuation of wildlife feeding and/or altering of activity periods would not be anticipated to result in any changes in ambient noise or vibration levels for agriculture lands or urban areas.

Physical Exclusion

Physical exclusion methods restrict the access of wildlife to resources. These methods, including fences, tree protectors, and entrance barricades, provide a means of appropriate and effective prevention of wildlife damage in many situations. Fences are widely used to prevent damage to farm crops caused by rabbits and other wildlife. Predator exclusion fences constructed of woven wire or multiple strands of electrified wire are also effective in some areas; herd animals such as sheep may be protected through fencing/penning. If large areas are fenced, the predators have to be removed from the enclosed area to make it useful.

Entrance barricades of various kinds are used to exclude bobcats, coyotes, foxes, opossums, raccoons, or skunks from dwellings, storage areas, gardens, or other areas. Metal flashing may be used to prevent entry of small rodents into buildings. Sheathing or tree protectors can be used in some situations to avoid damage to trees but may be impractical where there are numerous plants to protect.

WS-California wildlife specialists may recommend installation of physical exclusion features to landowners or agriculture managers but would not undertake the installation activities. Routine maintenance of fencing and farm infrastructure on agriculture lands is understood to be an integral part of farming operations and would not constitute a “project” under CEQA or NEPA. Therefore, while installation of fencing, entrance barricades, and even metal tree flashing could involve powered equipment including post-hole auger, pick-up truck, electric saw, and nail gun, noise and vibration from such installation / maintenance activities would not be separate from or greater than noise and vibration levels associated with normal agricultural functions being carried out on the property.

From a noise and vibration perspective, installation of physical exclusion features such as barrier fencing, would not be anticipated to appreciably alter existing noise or vibration patterns for existing livestock handling on agricultural lands throughout California.

Deterrents

Electronic Distress Sounds

Distress and alarm calls of various animals have been used singly and in conjunction with other scaring devices to successfully scare or harass animals. Many of these sounds are available in digital format. Animals react differently to distress calls; their use depends on the species and the problem. Calls may be played for short (few seconds)

bursts, for longer periods, or even continually, depending on the severity of damage and relative effectiveness of different treatment or "playing" times. Some artificially created sounds also repel birds in the same manner as recorded "natural" distress calls. Depending upon the sound level required for distress sounds to be effective, they could be well above ambient levels, leading to adverse noise affects at proximate residential uses. It should be noted that WS-California wildlife specialists would not implement a solution employing electronic distress sounds in residential locations but may offer recommendations to the property owner regarding their potential use.

Propane Exploders and Pyrotechnics

Propane exploders/cannons operate on propane gas and are designed to produce loud explosions at controllable intervals. They are strategically located (elevated above the vegetation, if possible) in areas of high wildlife use to frighten wildlife from the problem site. Pyrotechnic devices, such as shell crackers or scare cartridges fired from a shotgun, noise bombs, whistle bombs, racket bombs, rocket bombs fired from a flare pistol, firecrackers, rockets, and Roman candles, are used for dispersing animals, particularly birds. The sound levels from propane exploder and pyrotechnic use would be well above ambient levels and would be very noticeable, potentially leading to adverse noise affects at proximate residential uses. It should be noted that WS-California wildlife specialists would not implement a solution employing propane exploders or pyrotechnics in residential locations but may offer recommendations to a property owner regarding their potential use.

Chemical Repellents

Chemical repellents are rough materials that can discourage, reduce, or prevent the gnawing behavior of rodents, tacky or sticky substances to prevent perching, or non-hazardous chemical compounds designed to cause pain or discomfort. Effective and practical chemical repellents need to be nonhazardous to wildlife; nontoxic to plants, seeds, and humans; resistant to weathering; easily applied; reasonably priced; and capable of providing good repelling qualities. Given the requirements for their successful use, chemical repellents would be recommended or employed by a WS-California wildlife specialist only on rare occasions. The reaction of different animals to a single chemical formulation varies, and for any species there may be variations in repellency between different habitat types. The majority of chemical repellents are strictly regulated, and suitable repellents are not available for many wildlife species or wildlife damage situations. Methyl anthranilate is a liquid repellent that could be applied with a back-pack sprayer and may involve the use of an all-terrain vehicle and might thus generate noise that could adversely impact residences in proximity to the spray operations.

Direct Control Methods

Trapping

A wide variety of traps are used to capture pest and/or predator wildlife for relocation or lethal dispatch (euthanasia).. Use of traps and snares would not be anticipated to generate substantial noise or vibration, but equipment used to set and retrieve the traps (i.e., pick-up truck, all-terrain vehicle [ATVs]), etc.) could generate noise with a potential to adversely impact proximate residences.

Rocket Nets/Cannon Nets

Rocket nets and cannon nets are common types of animal traps used to capture live animals, usually birds, but they also have been used to catch large animals such as various species of deer. A rocket net consists of an

accordion folded rectangular net with one or more rockets that cast the leading edge of the net over the target area. The rocket charges contain a propellant (e.g., black powder) and an enclosed electric match is used to ignite the propellant load. A cannon net is similar to a rocket net except a cannon-net projectile is a heavy metal barrel which is fired from a launch-rod attached to a metal plate. Cannon propellant is smokeless gunpowder ignited by an electric match. An air-cannon net is also available, which is a similar device that propels a weight attached to a rocket net via a rope without the use of explosives. An air-cannon net system is charged with a portable air compressor and set out in a similar fashion to the rocket nets. The air-cannon is quieter than the rocket net or traditional cannon net. The use of a rocket net or traditional cannon net would generate sound levels well above ambient levels and would be very noticeable, potentially leading to adverse noise effects at proximate residences. An air-cannon net would not be anticipated to generate substantial noise, but air compressor noise to recharge it could be noticeable at proximate residences. Other nets used for WDM (e.g., bow nets, ez-catch nets, drop nets, hand nets, mist nets) are anticipated to generate similar or less substantial noise and vibration than rocket nets/cannon nets.

Shooting

Shooting is frequently performed for predators such as coyotes, bobcats, and foxes that have preyed on livestock. Shooting is limited to locations where it is legal and safe to discharge firearms and any shooting must be performed in conformance with applicable firearm safety precautions, laws, and regulations. Shooting is used selectively for target species but may be relatively expensive because of the staff hours required. The use of non-lead ammunition is required under California Fish and Game Code (FGC) Section 3004.5(b). The Airborne Hunting Act (Shooting from Aircraft Act) enacted by Congress in 1971 was added to the Fish and Wildlife Act of 1956 (Section 742j-1) and allows shooting animals from aircraft for certain reasons, including protection of wildlife, livestock, and human life as authorized by a federal- or state-issued license or permit. The shooting of predators would generate sound levels well above ambient levels and would be very noticeable, potentially leading to adverse noise affects at proximate residences.

1.3 Noise Background and Terminology

1.3.1 Fundamentals of Environmental Noise

Vibrations, traveling as waves through air from a source, exert a force perceived by the human ear as sound. Sound pressure level (referred to as sound level) is measured on a logarithmic scale in decibels (dB) that represents the fluctuation of air pressure above and below atmospheric pressure. Frequency, or pitch, is a physical characteristic of sound separate from sound level and is expressed in units of cycles per second or hertz. The normal frequency range of hearing for most people extends from about 20 to 20,000 hertz. The human ear is more sensitive to middle and high frequencies, especially when the noise levels are quieter. As noise levels get louder, the human ear starts to hear the frequency spectrum more evenly. To accommodate for this phenomenon, a weighting system was developed to evaluate how loud a noise level is perceived by humans. The frequency weighting, called “A” weighting, is typically used for quieter noise levels, which de-emphasizes the low-frequency components of the sound in a manner similar to the response of a human ear. This A-weighted sound level is called the “noise level” and is referenced in units of A-weighted decibels (dBA). Table 1 presents typical noise levels for common outdoor and indoor activities.

Sound is measured on a logarithmic scale; a doubling of sound energy results in a 3-dBA increase in the noise level. However, changes in a community noise level of less than 3 dBA are not typically noticed by the human ear (Caltrans

2020a). Changes from 3 to 5 dBA may be noticed by some individuals who are extremely sensitive to changes in noise. A 5-dBA increase is readily noticeable (EPA 1974). The human ear perceives a 10 dBA increase in sound level as a doubling of the sound level (e.g., 65 dBA sounds twice as loud as 55 dBA to a human ear).

An individual's noise exposure occurs over a period of time; however, noise level is a measure of noise at a given instant in time. Community noise sources vary continuously, being the product of many noise sources at various distances, all of which constitute a relatively stable background or ambient noise environment. The background, or ambient, noise level gradually changes throughout a typical day, corresponding to distant noise sources such as traffic volume and changes in atmospheric conditions. The time-varying character of environmental noise is often described with use of statistical or percentile noise descriptors including L_{10}, L_{50}, and L_{90}. These are the noise levels equaled or exceeded during 10%, 50%, and 90% of the measured time interval. Sound levels associated with L_{10} typically describe transient or short-term events, such as the noise from distinct passing cars and trucks, measured from a position near a low-traffic roadway. L_{50} represents the median sound level during the measurement interval. Levels will be above and below this value exactly one-half of the accumulated measurement time. L_{90} is the sound level exceeded 90 percent of the time, and often is used to describe background noise conditions or sources that are continuous or "steady-state" in character.

Table 1. Typical Noise Levels Associated with Common Activities

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Flyover at 1,000 feet	105	
	100	
Gas Lawn Mower at 3 feet	95	
	90	
Diesel Truck at 50 feet, 50 miles per hour	85	Food Blender at 3 feet
	80	Garbage Disposal at 3 feet
Noisy Urban Area, Daytime	75	
	70	Vacuum Cleaner at 10 feet
Commercial Area	65	Normal speech at 3 feet
Heavy Traffic at 300 feet	60	
	55	Large Business Office
Quiet Urban Daytime	50	Dishwasher (in next room)
	45	
Quiet Urban Nighttime	40	Theater, Conference Room (background)
Quiet Suburban Nighttime	35	
	30	Library
Quiet Rural Nighttime	25	Bedroom at Night, Concert Hall (background)
	20	
	15	Broadcast/Recording Studio
	10	
	5	
Lowest Threshold of Human Hearing (Healthy)	0	Lowest Threshold of Human Hearing (Healthy)

Source: Caltrans 2020a.
Notes: dBA = A-weighted decibels.

Noise levels are generally higher during the daytime and early evening when traffic (including aircraft), commercial, and industrial activity is the greatest. As such, noise sources experienced during nighttime hours when background levels are generally lower can be potentially more conspicuous and irritating to the perceiver. To evaluate noise in a way that considers periodic fluctuations experienced throughout the day and night, a concept termed "community noise equivalent level" (CNEL) was developed, wherein noise measurements are weighted, added, and averaged over a 24-hour period to reflect magnitude, duration, frequency, and time of occurrence.

Different types of measurements are used to characterize the time-varying nature of sound. These measurements include the equivalent sound level (L_{eq}), the minimum and maximum sound levels (L_{min} and L_{max}, respectively), percentile-exceeded sound level (L_{xx}), the day-night sound level (L_{dn}), and the CNEL. The following list provides brief definitions of noise terminology used in this report.

- **Decibel** (dB) is a measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals.
- **A-weighted decibel** (dBA) is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
- **Equivalent sound level** (L_{eq}) is the constant level that, over a given time period, transmits the same amount of acoustic energy as the actual sound which varies over time. Equivalent sound levels are the basis for both the L_{dn} and CNEL scales.
- **Maximum sound level** (L_{max}) is the maximum sound level measured during the measurement period.
- **Minimum sound level** (L_{min}) is the minimum sound level measured during the measurement period.
- **Percentile-exceeded sound level** (L_{xx}) is the sound level exceeded X% of a specific time period. For example, L_{10} is the sound level exceeded 10% of the time.
- **Day-Night Average Sound Level** (L_{dn}) is a 24-hour average A-weighted sound level with a 10 dB penalty added to each of the hourly average noise levels occurring in the nighttime hours from 10:00 p.m. to 7:00 a.m. The 10 dB penalty is applied to account for increased noise sensitivity during the nighttime hours.
- **Community Noise Equivalent Level** (CNEL) is the average equivalent A-weighted sound level during a 24-hour day. CNEL accounts for the increased noise sensitivity during the evening hours (7:00 p.m. to 10:00 p.m.) and nighttime hours (10:00 p.m. to 7:00 a.m.) by adding 5 dB to the recorded hourly average sound levels in the evening and 10 dB to the hourly average sound levels at night.

1.3.1.1 Exterior Noise Distance Attenuation

Noise sources are classified in two forms: (1) point sources, such as stationary equipment or a group of construction vehicles and equipment working within a spatially limited area at a given time; and (2) line sources, such as a roadway with a large number of pass-by sources (motor vehicles). Sound generated by a point source typically diminishes (attenuates) at a rate of 6.0 dBA for each doubling of distance from the source to the receptor at acoustically "hard" sites and at a rate of 7.5 dBA for each doubling of distance from source to receptor at acoustically "soft" sites (Caltrans 2020a). Sound generated by a line source (i.e., a roadway) typically attenuates at a rate of 3 dBA and 4.5 dBA per doubling distance, for hard and soft sites, respectively (Caltrans 2020a). Sound levels can also be attenuated by human-made or natural barriers. For the purpose of a sound attenuation discussion, a hard or reflective site does not provide any excess ground-effect attenuation and is characteristic of asphalt or concrete ground surfaces, as well as very hard-packed soils. An acoustically soft or absorptive site is characteristic of unpaved loose soil or vegetated ground.

Here is an example of this distance-attenuation relationship for exterior noise. A 60-dBA noise level measured at 50 feet from a tractor installing fenceposts within a packed earth feedlot site would diminish to 54 dBA at 100 feet from the source, and to 48 dBA at 200 feet from the source. This scenario is governed by the point source attenuation for a hard site (6 dBA with each doubling of the distance). For the scenario where soft-site conditions exist between the point source and receptor, represented by natural vegetation, planted row crops, or plowed furrows adjacent to the work area, an attenuation rate of 7.5 dBA per doubling of distance would apply; the tractor noise measured as 60 dBA at 50 feet would diminish to 52.5 dBA at 100 feet from the source and to 45 dBA at 200 feet from the source, where soft ground exists between the sound source and the receptor location.

1.3.1.2 Structural Noise Attenuation

Sound levels can also be attenuated by human-made or natural barriers. Solid walls, berms, or elevation differences typically reduce noise levels in the range of approximately 5 to 15 dBA (Caltrans 2020a). Structures can also provide noise reduction by insulating interior spaces from outdoor noise. The outside-to-inside noise attenuation provided by typical structures in California ranges between 17 and 30 dBA with open and closed windows, respectively, as shown in Table 2.

Table 2. Outside-to-Inside Noise Attenuation (dBA)

Building Type	Open Windows	Closed Windows
Residences	17	25
Schools	17	25
Churches	20	30
Hospitals/offices/hotels	17	25
Theaters	17	25

Source: Transportation Research Board, National Research Council 1971.
Notes: dBA = A-weighted decibels.
As shown, structures with closed windows can attenuate exterior noise by a minimum of 25 to 30 dBA.

1.3.2 Fundamentals of Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. Heavy equipment operation, including stationary equipment that produces substantial oscillation or construction equipment that causes percussive action against the ground surface, may be experienced by building occupants as perceptible vibration. It is also common for groundborne vibration to cause windows, pictures on walls, or items on shelves to rattle. Although the perceived vibration from such equipment operation can be bothersome to building occupants, the vibration is seldom of sufficient magnitude to cause even minor cosmetic damage to buildings.

Peak particle velocity (PPV) describes particle movement over time (in terms of physical displacement of mass, expressed as inches/second or in/sec) and is generally employed for the discussion of vibration impacts on people and structures. Groundborne vibration generated by construction projects is usually highest during pile driving, rock blasting, soil compacting, jack hammering, and demolition-related activities. Next to pile driving and soil compacting, grading activity has the greatest potential for vibration impacts when earthwork involves large bulldozers, large trucks, or other heavy equipment.

1.3.3 Health Effects of Noise

Noise is known to have a number of different adverse effects on humans. Based upon these recognized adverse effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on effects of noise on people such as hearing loss (not generally associated with community noise), communication interference, sleep interference, physiological responses, and annoyance (EPA 1974).

1.4 Noise Regulation and Management

1.4.1 Federal

1.4.1.1 Federal Aviation Administration Standards

Enforced by the Federal Aviation Administration, Code of Federal Regulations (CFR) Title 14, Part 150, prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs, including the process for evaluating and approving or disapproving those programs. Title 14 also identifies those land uses that are normally compatible with various levels of exposure to noise by individuals. The Federal Aviation Administration has determined that interior sound levels up to 45 dBA L_{dn} (or CNEL) are acceptable within residential buildings. The Federal Aviation Administration also considers residential land uses to be compatible with exterior noise levels at or less than 65 dBA L_{dn} (or CNEL). Noise generating activities conducted at airports for the purpose of discouraging avian species from roosting, nesting, or foraging within airport facility property would be subject to these noise level limits at proximate residential properties. Because noise contours associated with airport operations are largely dependent upon low altitude aircraft maneuvers (descent and ascent for landing and take-off) it is reasonable to apply the same residential noise exposure limits to low altitude aircraft operations conducted for wildlife damage management activities, even though such is not covered under airport noise regulations.

1.4.1.2 Federal Housing and Urban Development Standards

The U.S. Department of Housing and Urban Development (HUD) has also established an exterior noise exposure limit of 65 L_{dn} for residences (24 CFR 51 Subpart B). For consistency in analyzing noise impacts for Proposed Project activities throughout California, a criterion based on the HUD and FAA standards of 65 dBA L_{dn} is applied for daytime management activity. Proposed Project activities would be temporary in duration, with associated equipment and vehicles operating only for hours or days at a time, and at several different locations per deployment. Thus, the predicted acoustical combination of these probable brief or intermittent activity-related noises occurring throughout the day, calculated as a day- night sound level that includes periods when no noise is expected, is compared with 65 dBA L_{dn} that HUD and FAA consider an acceptable standard for exterior noise exposure at residences (the most common noise-sensitive land use/receiver). Activities that must be conducted at night (10:00 p.m. to 7:00 a.m.) are evaluated against a more restrictive limit (refer to the World Health Organization standards in Section 1.4.3).

1.4.1.3 Department of the Interior, Bureau of Land Management (BLM)

Public land that is managed by the Bureau of Land Management (BLM), which is an agency within the United States Department of the Interior (DOI), is present within California. The BLM is subject to regulations established in Title

43 (Public Land: Interior) of the CFR. The CFR criteria applicable to activities carried out on land administered by the BLM and are provided below:

> 43 CFR 8365.2-5 – Public health, safety and comfort.
>
> On developed recreation sites and areas, unless otherwise authorized, no person shall:
>
> (a) Discharge or use firearms, other weapons, or fireworks;
>
> 43 CFR 8365.2-2 – Audio devices.
>
> On developed recreation sites, or areas, unless otherwise authorized, no person shall:
>
> Operate or use any audio device such as a radio, television, musical instrument, or other noise producing device or motorized equipment in a manner that makes unreasonable noise that disturbs other visitors.

1.4.1.4 Department of Agriculture, U.S. Forest Service

California contains land that is managed by the United States Forest Service (USFS), which is an agency within the United States Department of Agriculture (USDA). The USFS is subject to regulations established in Title 36 (Parks, Forests, and Public Property) of the CFR. 36 CFR 261 Subpart A contains a broad discussion of prohibitions applicable to acts and omissions occurring in the National Forest System or on a National Forest System road or trail, as well as property administered by the USFS. 36 CFR 261 Subpart B describes the process by which the Chief, each Regional Forester, each Experiment Station Director, the Administrator of the Lake Tahoe Basin Management Unit, and each Forest Supervisor may issue orders which close or restrict the use of described areas within the area over which they have jurisdiction. Lastly, 36 CFR 261 Subpart C provides for issuance of regulations by the Chief, and each Regional Forester to whom the Chief has delegated authority, prohibiting acts or omissions within all or any part of the area over which they have jurisdiction. The CFR criteria applicable to the project activities carried out on land administered by the USFS are provided below:

> 36 CFR 261.10 – Occupancy and use.
>
> The following are prohibited:
>
> (d) Discharging a firearm or any other implement capable of taking human life, causing injury, or damaging property as follows:
>
> > (1) In or within 150 yards of a residence, building, campsite, developed recreation site, or occupied area, or
> >
> > (2) Across or on a National Forest System road or a body of water adjacent thereto, or in any manner or place whereby any person or property is exposed to injury or damage as a result in such discharge.
> >
> > (3) Into or within any cave.

(i) Operating or using in or near a campsite, developed recreation site, or over an adjacent body of water without a permit, any device which produces noise, such as a radio, television, musical instrument, motor or engine in such manner and at such a time so as to unreasonably disturb any person.

(k) Use or occupancy of National Forest System land or facilities without special-use authorization when such authorization is required.

(l) Violating any term or condition of a special-use authorization, contract or approved operating plan.

(p) Use or occupancy of National Forest System lands or facilities without an approved operating plan when such authorization is required.

1.4.2 State

1.4.2.1 California Department of Transportation

The California Department of Transportation (Caltrans) conducted extensive research on human annoyance and damage to structures caused by vibration from short term construction activities and from long term highway operations. The criteria established by Caltrans are commonly used to assess vibration impacts from all types of projects and activities; for consistency in analyzing vibration impacts for Proposed Project activities throughout California, criteria based on the Caltrans standards are employed. Caltrans uses a threshold of 0.2 in/sec PPV for annoyance to persons, where a continuous vibration source is involved; for transient sources (represented by construction activities), Caltrans uses a threshold of 0.24 in/sec PPV (which equates to a distinctly perceptible level). For commercial buildings constructed of concrete and steel, Caltrans identifies a damage threshold of 0.5 in/sec PPV. For residential structures employing concrete foundation and wood frame construction, Caltrans identifies a conservative damage threshold vibration level standard of 0.3 in/sec PPV (Caltrans 2020b).

1.4.2.2 California Noise Control Act of 1973

Sections 46000 through 46080 of the California Health and Safety Code, known as the California Noise Control Act of 1973, declares that excessive noise is a serious hazard to the public health and welfare and that exposure to certain levels of noise can result in physiological, psychological, and economic damage. It also identifies a continuous and increasing bombardment of noise in urban, suburban, and rural areas. The California Noise Control Act declares that the State of California has a responsibility to protect the health and welfare of its citizens by the control, prevention, and abatement of noise. It is the policy of the state to provide an environment for all Californians free from noise that jeopardizes their health or welfare.

1.4.2.3 Office of Planning and Research General Plan Guidelines

The State of California's General Plan Guidelines published by the Office of Planning and Research (OPR 2003) evaluate the compatibility of various land uses as a function of community noise exposure. According to the OPR Guidelines, the maximum recommended exterior noise exposure level for residences, motels, and hotels is 65 dBA L_{dn} or CNEL.

1.4.2.4 California Department of Parks and Recreation

California Department of Parks and Recreation (CA State Parks), which is an agency of the State of California, manages park properties throughout the State. CA State Parks is subject to regulations established in Division 3 of Title 14 (Department of Parks and Recreation) of the California Code of Regulations (CCR). The CCR criteria applicable to Proposed Project activities that could be conducted within CA State Park properties are provided below:

> Special Permits (14 CCR 4309)
>
> The Department may grant a permit to remove, treat, disturb, or destroy animals or geological, historical, archaeological or paleontological materials; and any person who has been properly granted such a permit shall to that extent not be liable for prosecution for violation of the foregoing.
>
> Control of Animals (14 CCR 4312)
>
> (c) No person shall keep a noisy, vicious, or dangerous dog or animal or one which is disturbing to other persons, in any unit and remain therein after he/she has been asked by a peace officer to leave.
>
> Peace and quiet (14 CCR 4320)
>
> (c) No person shall, at any time, use outside machinery or electronic equipment including electrical speakers, radios, phonographs, televisions, or other devices, at a volume which is, or is likely to be, disturbing to others without specific permission of the Department.

1.4.2.5 California Right-to-Farm Act of 1981

Section 3482.5 of the California Civil Code, known as the California Right-to-Farm (RTF) Act, protects certain types of agriculture operations from nuisance suits when such operations impact neighboring property, for example through the creation of noise or air pollution (i.e., odors). California's RTF protections apply to either private nuisance suits (those brought by neighbors or private citizens) or public nuisance suits (those brought by the government on behalf of the public). Only commercial agricultural operations, activities, and facilities receive protection from nuisance suits under California's RTF; such protections are afforded after a commercial agricultural enterprise has been in operation for three years. The protection afforded by the California RTF is limited to nuisance suits and it does not exempt agricultural operations from compliance with other applicable restrictions or standards under other state, federal, or local statutes and regulations.

1.4.3 World Health Organization

The World Health Organization (WHO) adopted guidelines in response to growing concerns over adverse health effects associated with community noise occurrence (Berglund *et al*. 1999). Noise occurring at nighttime was identified as a growing concern, given the potential for sleep disruption when loud noises occur during the overnight period. WHO recommends that for work which must be conducted during nighttime, it should be governed by an 8–hour L_{eq} of 45 dBA; an additional criterion of 60 dBA L_{max} throughout this 8–hour period is also recommended for discrete or single-noise events. The criteria are to be applied at the exterior façade of any occupied residence that

could be impacted by the nighttime noise generation. For consistency in analyzing nighttime noise impacts for Proposed Project activities throughout California, criteria based on these WHO standards are employed.

1.4.4 Local

There are a total of 58 counties and 482 cities within California, a quantity that makes discussion of individual noise regulations per jurisdiction unmanageable. However, Government Code, Title 7 (Planning and Land Use), requires each City and County to prepare a General Plan, of which a Noise Element is a mandatory component. While each jurisdiction has the authority under their adopted Noise Element to establish unique noise exposure limits for each land use category, the OPR issued guidelines for preparation of Noise Elements has a maximum recommended exterior noise exposure level for noise-sensitive land uses including residences, motels, and hotels of 65 dBA L_{dn} or CNEL. Consequently, the most commonly adopted exterior limit found in local General Plans for these land uses is 65 dBA CNEL (or L_{dn}), which can generally be assumed to be applicable for Proposed Project activities performed in areas subject to local jurisdiction authority. Nevertheless, CDFA and WS-California would rely on and coordinate with local agencies to identify local noise regulations applicable to Proposed Project activities.

Local noise regulations or policies may have more stringent noise thresholds than those adopted herein. The Proposed Project would not authorize entities to violate or supersede such applicable requirements. However, local noise regulations often exempt agricultural operations and related activities from one or more of their provisions (e.g., exterior noise thresholds at or beyond receiving property lines of the sound source), so coordination between local agencies and CDFA and WS-California-California could identify or define Proposed Project features or processes that qualify for such exemptions or exceptions.

By way of example, Section 9.36.030 Exemptions from the Placer County Code provides:

> 9. Sound sources associated with agricultural operations on agricultural land, as defined by Placer County Code Article 5.24.040, which are carried out in any manner consistent with the practice and within the standards of the agricultural industry. This includes without limitation all mechanical devices, apparatus or equipment utilized for the protection or salvage of agricultural crops during periods of adverse weather conditions or when the use of mobile sources is necessary for pest control.

Furthermore, some counties or municipalities may provide a codified process for waivers (at the discretion of a local officer, or via permission from a neighboring receptor or land use) that may be appropriate for short-duration Proposed Project activities and would depend on allowable timeframes and other qualifying conditions. Thus, where applicable, these exemptions, exceptions, and waivers could relieve the Proposed Project activities from meeting local thresholds that are more stringent than those used herein.

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2 Environmental Setting

2.1 Sensitive Receptors

Noise- and vibration-sensitive receptors are locations where people reside or where the presence of unwanted sound or vibration could adversely affect the use of the land. Residences, hospitals, nursing care or assisted living facilities, guest lodging, and churches would be considered noise and vibration sensitive. Domestic pets would be included in the same residential population addressed under noise-sensitive land uses, as they would be afforded the same relief afforded by retreating indoors when exterior noise exposure reached annoyance levels; noise-related impacts to non-target wildlife species are normally considered within the scope of the biological resource assessment. In addition, vibration-sensitive land uses also include institutional uses such as laboratories where the activities within the building are particularly sensitive to vibration.

The specific areas and extent of individual Proposed Project activities would depend on various factors, including the target species and the management approaches available. Proposed Project activities would occur primarily in rural, residential, and agricultural environments. Project activities in urbanized areas would likely have a limited or rare occurrence, but noise- and vibration-sensitive receptors from all of the above-referenced categories may exist and could potentially be adversely affected by these less common Proposed Project activities. Scattered, or low-density, residences are common in agriculture zones and could therefore be adversely affected by noise or vibration from Proposed Project activities. It should also be noted that most WDM activities would be conducted within a small target area, would be temporary in nature, and would only be conducted in response to a specific request for service.

2.2 Existing Noise Levels

Given the geographic scope of the Proposed Project is the entire State of California, it is not practical to complete sound level measurements to establish the existing noise environment where each and every activity may occur. This conclusion is strengthened in that locations where activities may be needed have not been determined and will likely evolve over time. As previously stated, activities associated with the Proposed Project could occur in various locations throughout California, in urban, residential, and agricultural areas; therefore, the magnitude range (in dBA L_{eq} or dBA L_{dn}) of the existing ambient noise environment in areas where activities may occur would vary widely and would depend heavily on community noise sources in proximity to a given location. In general, the ambient outdoor sound environment that may be measured or perceived at a given location represents an aggregate of possibly many distinct nearby stationary or mobile sources combined with a multitude of other distant sources.

A characterization of the existing ambient outdoor sound levels at a noise-sensitive receptor (expressed as dBA L_{dn} or L_{eq}) that may be exposed to noise from Proposed Project activities is important with respect to the CEQA and NEPA assessment criteria. For reasonable comparisons appropriate in this analysis, Federal Transit Administration (FTA) noise assessment guidance provides two methodologies to estimate existing noise exposure throughout a given community (FTA 2018):

- proximity to transportation routes based on the perpendicular distances to highways, railroad lines, and other major roadways; and
- population density when noise from major surface transportation routes is far enough away, and ambient urbanized noise is dominated by local street traffic, building operations (e.g., heating, ventilating, and air conditioning), and community activities.

Table 3 correlates distance ranges from major roadways, other roadways, and rail lines to estimated daytime, nighttime, and L_{dn} ambient sound levels. Table 3 also identifies community noise levels (ambient exterior noise levels) based on population density ranges that may be used for areas that are far removed from transportation (i.e., road and rail facilities) noise sources.

Table 3. FTA Method Results for Estimating Existing Ambient Noise Levels (dBA)

FTA Method Based on Transportation	Distances from Major Transportation Sources (Feet)[a]							
Interstate Highway[b]	N/A		>800	400–800	200–400	100–200	50–100	<50
Rail[c]			500–800	240–500	120–240	60–120	30–60	10–30
Other Roadway[d]			>400	200–400	100–200	50–100	<50	N/A
FTA Method Based on Population	**People per Square Mile**							
	<300	300–1,000	1,000–3,000	3,000–10,000	10,000–30,000	>30,000	N/A	
Estimated Sound Level (dBA)								
Nighttime L_{eq}	30	35	40	45	50	55	60	65
Daytime L_{eq}	40	45	50	55	60	65	70	75
Day-Night Avg. (L_{dn})	40	45	50	55	60	65	70	75

Source: FTA 2018.

Notes: FTA = Federal Transit Administration; dBA = A-weighted decibels; N/A = not applicable; L_{eq} = equivalent sound level

[a] Distances do not include shielding from intervening rows of buildings. The general rule for estimating shielding attenuation in populated areas is as follows: assume one row of buildings every 100 feet provides a 4.5-decibel reduction for the first row and a 1.5 decibel reduction for every subsequent row.

[b] Roadways with four or more lanes that permit trucks, with traffic at 60 mph.

[c] Main line railroad corridors typically carry 5–10 trains per day at speeds of 30–40mph.

[d] These are parkways with traffic moving at 55 mph, but without trucks, and city streets with the equivalent of 75 or more heavy trucks per hour and 300 or more medium trucks per hour at 30 mph.

3 Quantification of Project Noise Emissions

3.1 Methodology

3.1.1 Noise Sources Descriptions

One of the most extensive and widely used databases for sound levels from motorized or powered equipment is the Federal Highway Administration's Roadway Construction Noise Model (RCNM, Version 1.1, FHWA 2008). Although the focus is on equipment that would typically be used for the construction of transportation facilities, the list is comprehensive enough to be useful in assessing sound levels for nearly every activity for which powered equipment is used. Table 4 provides an excerpt from RCNM of the sound levels generated by various powered equipment that could be associated with Proposed Project activities.

Table 4. Selected Powered Equipment Noise Emission Levels from the RCNM

Equipment	Maximum Sound Level (dBA L_{max}) – 50 Feet from Source
Air compressor	78
Air horn/deterrent device	83
Generator	72
Pickup truck	55

Source: FHWA 2006, 2008.
Notes: RCNM = Roadway Construction Noise Model; dBA = A-weighted decibels; L_{max} = maximum sound level.

An additional widely used database for noise levels generated by sources including non-construction machinery, vehicles, and even wildlife is the Noise Navigator Sound Level Database (2013). Table 5 provides sound levels from the Noise Navigator and other references for these types of sources that are useful in assessing sound generation that would result from Project activities.

Table 5. Various Sound Source Noise Emission Levels – Other Reference Sources

Equipment	Maximum Sound Level (dBA L_{max}) – 50 Feet from Source
All-terrain vehicle (ATV)[a]	75
Piper PA-18 (Super Cub)[b]	92
Crows[a]	47
Dog barking[a]	60
Hammer strike (e.g., sledge on stake)	64

Sources: [a]Berger 2013; [b]FAA 1997.
Notes: dBA = A-weighted decibels; L_{max} = maximum sound level.

The most substantial noise sources would be associated with potential wildlife deterrent methods and direct control activities and would include firearms and explosive devices. Published sound level test data from manufacturers or

distributors of such items are presented in Table 6 and were used in assessing sound generation that would result from Project activities.

Table 6. Sound Source Noise Emission Levels for Firearms and Explosive Devices

Equipment	Maximum Sound Level (dBA L_{max}) 3.28 feet (1 Meter) from Source	Maximum Sound Level (dBA L_{max}) 50 Feet from Source[a]
Rocket net/cannon net[b]	150	126
Propane exploder[c]	122	98
Pyrotechnic (Screamer Siren)[c]	92	68
Pyrotechnic (CAPA)[c]	142	118
308 caliber rifle[d]	173	149
308 caliber rifle with sound suppressor[d]	149	125
22 caliber rifle[d]	153	129
22 caliber rifle with sound suppressor[d]	129	105
22 caliber rifle, subsonic ammo, with sound suppressor[d]	75	51
12 gauge shotgun[e]	164	140
12 gauge shotgun with sound suppressor[e]	137	113
Daisy Red Ryder BB gun[f]	97	73

Sources:
a Calculated with exterior noise attenuation of 20*LOG(d/dref); and where d is the horizontal distance between a source and a receiver position, and dref is the reference distance at which the sound source L is defined.
b E.A.R. Customized Hearing 2023 – based on average shotgun noise data.
c Reed-Joseph 2022a, 2022b, 2022c.
d Ammo-to-Go 2019.
e Silencer Central 2022.
f Felix and Massey 2022.
Notes: dBA = A-weighted decibels; L_{max} = maximum sound level.

3.1.2 Methodology – Noise Level Quantification for Project Activities

RCNM allows the user to assemble a list of powered equipment that would be employed for a given activity, and then based upon the reported sound emission level for each piece of included equipment, the model will calculate the sound level from the equipment use at any specified distance. RCNM includes a use factor for each piece of equipment, which reflects the percentage over a given time when the equipment is in full operation; the individual use factors are included in the calculation of average sound levels for each given piece of equipment. RCNM includes appropriate equations for outdoor distance attenuation, and for the addition of the individual sound levels at distance into a composite sound level for all the included equipment. (FHWA 2006, 2008).

RCNM can also calculate noise levels for custom sources not found in RCNM, as long as the sound level at 50 feet and a use factor are supplied for the custom entries (use factor values are not limited to those included in the native RCNM model). Sound attenuation with distance and the summing of noise levels at distance for the custom sources and the native RCNM equipment are handled the same way. (FHWA 2006, 2008).

From the available Proposed Project information regarding WDM methods and techniques, Dudek acousticians assembled an anticipated equipment list for Project activities that would involve noise generation of a substantial degree. The RCNM, Noise Navigator, and manufacturer sound data (refer to Tables 4-6, above) were used to identify

the sound generation level of each piece of anticipated equipment or machinery, and appropriate entries were made in RCNM version 1.1 (FHWA 2008). The RCNM was then run to identify average noise levels (L_{eq}) that would be generated by a specific Project activity at a reference distance of 50 feet. The resulting L_{eq} value for each specific Project activity was then averaged over an 8-hour period, using an expected duration of the activity compared to the 8 hours available in a typical daytime or nighttime work schedule. The duration of any given activity is expressed in hours or minutes, which is identified in each of the results tables. The RCNM was re-run successively with different distances for each individual activity, until the daytime target of 65 dBA L_{eq} 8-hour was reached. This distance represents the setback from residences needed for daytime completion of the given activity to achieve compliance with exterior noise exposure limits recommended by many state and local agencies.. The RCNM was then again re-run successively with different distances for each individual activity, until the nighttime target of 45 dBA L_{eq} 8-hour was reached. This distance represents the setback from residences needed to to achieve compliance with nighttime exterior noise exposure limits recommended by WHO and many state and local agencies for nighttime completion of the given activity.

Parameters used in the noise analysis for various WDM activities (i.e., X number of explosions/gunshots every X minutes) are a conservative average and should not be interpreted to restrict WDM activities. Also, although daytime average noise levels are calculated across an 8-hour workday for comparison to representative noise standards, most Project equipment would not be used for 8 hours without interruption; the assessment assumes 8 hours of use to provide a conservative parameter to estimate potential noise levels.

3.1.3 Vibration Sources Descriptions

Similar to the construction equipment noise data compiled by the Federal Highway Administration (FHWA), the California Department of Transportation (Caltrans) has been assembling data for vibration levels generated by heavy construction equipment operation during the building of transportation projects for many years (Caltrans 2020b). Along with vibration source levels for construction equipment, Caltrans has developed an equation to determine the vibration level at a given distance from the equipment operations. The Caltrans data covers common heavy-duty construction equipment and equipment with substantial vibration generation, such as pile drivers and jackhammers. However, the equipment with vibration generation potential that may be employed for the Project, namely a pick-up truck, is not included in the Caltrans data. Consequently, vibration source levels for a pick-up truck was derived from a published research paper (Shiferaw 2021). The reported values are for a standard single-cab pick-up truck traveling at 50 miles per hour (mph; Shiferaw 2021). Although pickup trucks may travel 50 mph between sites or on an airfield, typically much slower speeds are employed when conducting actual WDM activities; therefore, the vibration level in Table 7 represents the maximum, which would not be realized under most circumstances.

Table 7. Vibration Velocities for Typical Vehicles

Equipment	Peak Particle Velocity at 6.56 Feet (2 Meters)
Pickup truck	0.114

Source: Shiferaw 2021.

3.1.4 Methodology - Vibration Assessment for Project Activities

With respect to potential vibration generation, the equipment most likely to be employed in carrying out Project activities consists of a pickup truck A pickup truck's peak particle velocity (PPV) at 2 meters (6.56 feet) is

0.114 inches per second (in/sec) (Shiferaw 2021). All-terrain vehicles (ATVs), and other equipment that may be employed for Project activities would have negligible vibration levels compared to a pickup truck.

Caltrans uses a threshold of 0.2 in/sec PPV for annoyance to persons to address construction, or 0.24 in/sec PPV for long-term vibration sources. All Project activities are anticipated to be infrequent (i.e., occurring fewer than 30 times per day), and therefore the construction threshold for human annoyance is the most appropriate. Caltrans identifies a conservative damage threshold vibration level standard of 0.3 in/sec PPV for historic structures (Caltrans 2020b). Using the human annoyance threshold of 0.2 in/sec PPV therefore is also appropriate (conservative) to avoid structural damage to even historic structures.

Using the vibration level value for a pickup truck or for a flatbed truck, the distance to the target vibration level of 0.2 in/sec PPV was determined, using the following formula:

$$\text{Peak particle velocity at distance (d)} = \text{peak particle velocity}(d_{ref}) * (d_{ref}/d)1.5$$

In the above equation, "d" is the distance between the receiver and a vibration source, and "d_{ref}" is the reference distance that applies for the indicated vibration magnitude. The calculated distance to a vibration level of 0.2 in/sec PPV represents the setback from residences to avoid significant vibration impacts for completion of Project activities.

3.2 Project Noise Assessment

3.2.1 Indirect WDM Methods

3.2.1.1 Electronic Distress Sounds

Distress and alarm calls of various animals have been used singly and in conjunction with other scaring devices to successfully scare or harass animals. Many of these sounds are available in digital format. Calls may be played for short (few seconds) bursts, for longer periods, or even continually, depending on the severity of damage and relative effectiveness of different treatment or "playing" times. The reported sound level for a crow and for a barking dog were used to represent a reasonable estimation of noise levels for electronic distress sounds, because crows provide very loud calls to warn the flock of danger and a barking dog should be louder than the distress sounds made by common prey species, or the calls of common predator species. As described in Section 3.1.2, Methodology, the RCNM (FHWA 2008) was used to quantify sound levels from the potential use of electronic distress sounds (specifically a barking dog and a crow call occurring simultaneously); Table 7 identifies inputs and results to the RCNM, including sound sources, the anticipated duration of the playing of the sounds, the source noise level for the calls, the use factor (set at 100%), and the distance used in calculating the combined 8-hour average noise level for comparison to the daytime 65 dBA L_{eq} 8-hour recommended limit (refer also to Appendix A for RCNM worksheet). As indicated in Table 8, the distance radius for noise activity to remain under the recommended limit during the daytime is 30 feet.

Table 8. Electronic Stress Sounds Activity – Noise Sources and Sound Level

Noise Source	Activity Duration Per Installed Device	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level (Feet)	Combined Noise Level (L_{eq} 8-Hour)
Barking dog	8 hours	100	60	30	65

Table 8. Electronic Stress Sounds Activity – Noise Sources and Sound Level

Noise Source	Activity Duration Per Installed Device	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level (Feet)	Combined Noise Level (L_{eq} 8-Hour)
Crow call	8 hours	100	47		

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; L_{eq} = equivalent sound level.

Table 9 provides the radius distance from Electronic Distress Sounds activity to sensitive receptors for sound levels that would remain compliant with the U.S. Department of House and Urban Development (HUD) guidance for daytime activity (HUD 2009) and the World Health Organization (WHO) guidance for nighttime activity (Berglund et al. 1999). As seen in Table 8, the constant playing of stress sounds based on reference noise levels combined for a dog barking and crow calling could occur at a distance of 30 feet or greater during the daytime and remain in compliance with the HUD standard.

Table 9. Electronic Stress Sounds – Minimum Separation Distances to Comply with Noise Criteria

Noise Source	Daytime per HUD Guidance (65 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (45 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (60 dBA L_{max})
Electronic Stress Sounds	30 feet	200 feet	50 feet

Source: Appendix A, RCNM worksheet.
Notes: HUD = U.S. Department of Housing and Urban Development; dBA = A-weighted decibels; L_{eq} = equivalent sound level; WHO = World Health Organization; L_{max} = maximum sound level.

According to Table 9, Electronic Stress Sounds could occur at night, at distances from sensitive receptors of 200 feet or greater and would comply with the established guidelines.

3.2.1.2 Propane Exploders

Propane exploders operate on propane gas and are designed to produce loud explosions at controllable intervals. They are strategically located (elevated above the vegetation, if possible) in areas of high wildlife use to frighten wildlife from the problem site. These problem sites are typically airfields or landfills. The published sound level for the Scare-Away LP Gas Cannon (Reed-Joseph 2022a) was used in RCNM (FHWA 2008) to evaluate the sound level from propane exploder devices; Table 10 identifies this sound source, along with the anticipated duration of "explosions" at a given activity area, the source noise level for the explosion, the use factor (set at 0.7% or 1 explosion every 5 minutes with a duration of 2 seconds apiece; Reed-Joseph 2022a), and the distance used in calculating the combined 8-hour average noise level for comparison to the daytime 65 dBA L_{eq} 8-hour recommended limit (refer also to Appendix A for the RCNM worksheet). As indicated in Table 10, the distance radius for noise activity to remain under the recommended limit during the daytime is 140 feet.

Table 10. Propane Exploders Activity – Noise Sources List and Resulting Sound Level

Noise Source	Activity Duration Per Installed Device	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level (Feet)	Combined Noise Level (L_{eq} 8-Hour)
Propane blaster	8 hours	0.7	98	140	65

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; L_{eq} = equivalent sound level.

Table 11 provides the radius distance from Propane Exploders activity to sensitive receptors for sound levels that would remain compliant with the HUD guidance for daytime activity and the WHO guidance for nighttime activity. As shown in Table 11, the use of propane exploders and similar devices with one "detonation" every 5 minutes could occur at a distance of 140 feet or greater from sensitive receptors during the daytime and remain in compliance with the HUD standard.

Table 11. Propane Exploders – Minimum Separation Distances to Comply with Noise Criteria

Noise Source	Daytime per HUD Guidance (65 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (45 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (60 dBA L_{max})
Propane Blaster	140 feet	1,000 feet	1,850 feet

Source: Appendix A, RCNM worksheet.
Notes: HUD = U.S. Department of Housing and Urban Development; dBA = A-weighted decibels; L_{eq} = equivalent sound level; WHO = World Health Organization; L_{max} = maximum sound level.

As seen in Table 11, propane exploder use could occur at night, at distances from sensitive receptors of 1,850 feet or greater and would comply with the established WHO guidelines.

3.2.1.3 Pyrotechnics

The published sound levels for the Screamer Siren and CAPA (an anti-bird harassment cartridge that travels roughly 1,000 feet downrange before it emits a 150 dBA report) (Reed-Joseph 2022b, 2022c) were used in the RCNM (FHWA 2008) to evaluate the sound level from pyrotechnic devices. Pyrotechnics are most often used by WDM specialists to disperse birds from airfields to reduce wildlife strike hazards. Table 12 identifies these sound sources, along with the anticipated duration of "pyrotechnic firings" at a given activity area, the source noise level for the firing, the use factor (set at 0.3% for each of the two pyrotechnics or 5 firings in a 30-minute period for each of the two pyrotechnics, with a duration of 1 second apiece), and the distance used in calculating the combined 8-hour average noise level for comparison to the daytime 65 dBA L_{eq} 8-hour recommended limit (refer also to Appendix A for RCNM worksheet). As indicated in Table 12, the distance radius for noise activity to remain under the recommended limit during the daytime is 200 feet.

Table 12. Pyrotechnics Activity – Noise Sources and Resulting Sound Level

Noise Source	Activity Duration Per Installed Device	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level	Combined Noise Level (L_{eq} 8-Hour)
Screamer siren	30 minutes	0.3	68	200 feet	65
CAPA	30 minutes	0.3	118		

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; L_{eq} = equivalent sound level.
A CAPA is an anti-bird harassment cartridge.

As shown in Table 12, the use of two individual pyrotechnics with "firing" five times per 30-minute period could occur at a distance of 200 feet or greater from sensitive receptors during the daytime and remain in compliance with the HUD standard (HUD 2009).

3.2.1.4 Chemical Repellents

Chemical repellents are compounds that prevent consumption of food items or use of an area. They operate by producing an undesirable taste, odor, feel, or behavior pattern. Effective and practical chemical repellents need to be nonhazardous to wildlife; nontoxic to plants, seeds, and humans; resistant to weathering; easily applied; reasonably priced; and capable of providing good repelling qualities. Many are baits or tacky substances that are applied to perches. Methyl anthranilate is a liquid repellent that could be applied with a backpack sprayer and might involve use of an ATV for access to spray application areas. The RCNM (FHWA 2008) was used to evaluate the sound level from chemical repellent activity; Table 13 identifies these sound sources, along with the anticipated duration of the spraying activity in a given location, the source noise level for the equipment, the use factor, and the distance used in calculating the combined 8-hour average noise level for comparison to the daytime 65 dBA L_{eq} 8-hour recommended limit. As indicated in Table 13, the distance radius for noise activity to remain under the recommended limit during the daytime is 35 feet.

Table 13. Chemical Repellents Spray Activity – Noise Sources and Resulting Sound Level

Noise Source	Activity Duration per Site*	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level	Combined Noise Level (L_{eq} 8-Hour)
All-Terrain Vehicle (ATV)	3 hours	40	75	35 feet	65

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; L_{eq} = equivalent sound level.
* Site would be equivalent to approximately 1 acre, the smallest expected rural residential lot in agricultural zones.

According to Table 13, the spray application of chemical repellent could occur at a distance of 35 feet or greater during the daytime and remain in compliance with the HUD standard.

3.2.2 Direct Wildlife Damage Management Methods

3.2.2.1 Trapping

Equipment used to set and retrieve the traps could include an ATVor pick-up truck. The RCNM (FHWA 2008) was used to evaluate the sound level from trapping activity; Table 14 identifies these sound sources, along with the anticipated duration of the trap setting or collection/removal, the source noise level for the equipment, the use factor, and the distance used in calculating the combined 8-hour average noise level for comparison to the daytime 65 dBA L_{eq} 8-hour recommended limit. As indicated in Table 14, the distance radius for noise activity to remain under the recommended limit during the daytime is 25 feet. This analysis is performed with a pickup truck traveling at 50 mph; slower truck speeds would likely result in a shorter distance limit from trapping locations to any residence.

Table 14. Trapping Activity Equipment – Noise Sources and Resulting Sound Level

Noise Source	Activity Duration per Site*	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level	Combined Noise Level (L_{eq} 8-Hour)
ATV	30 minutes	40	75	25 feet	65
Pick-up truck	30 minutes	40	55		

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; L_{eq} = equivalent sound level; ATV = all-terrain vehicle.
* Site would be equivalent to approximately 1 acre, the smallest expected rural residential lot in agricultural zones.

Table 15 provides the radius distance from trapping activities to sound levels that would remain compliant with the HUD guidance for daytime activity (HUD 2009) and the WHO guidance for nighttime activity (Berglund et al. 1999). According to Table 15, trap setting and collecting could occur at a distance of 25 feet or greater during the daytime and remain in compliance with the HUD standard.

Table 15. Trapping Activity – Minimum Separation Distances to Comply with Noise Criteria

Activity	Daytime per HUD Guidance (65 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (45 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (60 dBA L_{max})
Trapping	25 feet	180 feet	180 feet

Source: Appendix A, RCNM worksheet.
Notes: HUD = U.S. Department of House and Urban Development; dBA = A-weighted decibels; L_{eq} = equivalent sound level; WHO = World Health Organization; L_{max} = maximum sound level.

According to Table 15, trapping activity could occur at night, at distances from sensitive receptors of 180 feet or greater and would comply with the established guidelines.

3.2.2.2 Rocket Nets/Cannon Nets

Conventional rocket and cannon nets use two or more gunpowder-fueled launchers. No sound level data for detonation of a rocket or cannon net system could be found for this analysis. To address these systems,

acousticians used the average sound level for shotguns (E.A.R. Customized Hearing 2023), with two simultaneous detonations per net launch. Equipment used to set the nets and to retrieve trapped animals could include a pick-up truck. The RCNM (FHWA 2008) was used to evaluate the sound level from rocket net/cannon net activity; Table 16 identifies these sound sources, along with the anticipated duration of rocket/cannon net launch activity at a given activity area, the source noise level for the firing, the use factor (set at 0.05%, or one launch during the 30-minute work period), and the distance used in calculating the combined 8-hour average noise level for comparison to the daytime 65 dBA L_{eq} 8-hour recommended limit (refer also to Appendix A for the RCNM worksheet). As indicated in Table 16, the distance radius for noise activity to remain under the recommended limit during the daytime is 250 feet.

Table 16. Rocket/Cannon Net Use – Noise Sources and Resulting Sound Level

Noise Source	Activity Duration per Site*	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level	Combined Noise Level (L_{eq} 8-Hour)
Pick-up truck	30 minutes	40	55	250 feet	65
Rocket net	30 minutes	0.05	126		

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum noise level; dBA = A-weighted decibels; L_{eq} = equivalent sound level.
* Site would be equivalent to approximately 5 acres to maintain specified separation distance evaluated.

Table 17 provides the radius distance from Rocket/Cannon Net activity to sensitive receptors for sound levels that would remain compliant with the HUD guidance for daytime activity and the WHO guidance for nighttime activity. As shown in Table 17, one launch of a rocket net or cannon net within an 8-hour period could occur at a distance of 250 feet or greater from sensitive receptors during the daytime and remain in compliance with the HUD standard.

Table 17. Rocket/Cannon Net Use – Minimum Separation Distances to Comply with Noise Criteria

Activity	Daytime per HUD Guidance (65 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (45 dBA L_{eq} 8-Hour)	Nighttime per WHO Guidance (60 dBA L_{max})
Rocket/cannon net	250 feet	2,000 feet	13,000 feet

Source: Appendix A, RCNM worksheet.
Noise: HUD = U.S. Department of House and Urban Development; dBA = A-weighted decibels; L_{eq} = equivalent sound level; WHO = World Health Organization; L_{max} = maximum sound level.

As shown in Table 17, Rocket/Cannon Net use could occur at night, at distances from sensitive receptors of 13,000 feet (approximately 2.5 miles) or greater and would comply with the established WHO guidelines.

3.2.2.3 Shooting

Aerial Shooting

Shooting is frequently performed for predators such as coyotes, bobcats, and foxes that have preyed on livestock. Aerial shooting is limited to locations where it is legal and safe to discharge firearms. Aerial shooting is used selectively for target species but may be relatively expensive because of the use of an aircraft and staff hours

required. The Airborne Hunting Act allows shooting of animals from aircraft for protection of livestock. A representative aircraft noise level (Cessna 172, a four-seat, single-engine, fixed-wing aircraft) was obtained from the Federal Aviation Administration (FAA 1997); the published sound levels for a 12-gauge shotgun (Ammo-to-Go 2019) were used to represent gunfire sound levels for Aerial Shooting. The RCNM (FHWA 2008) was used evaluate the sound level from Aerial Shooting. Table 18 identifies these sound sources, the anticipated duration of shooting/hunting at a given activity area, the duration for aircraft use in the area, the source noise level for the gun-shot and aircraft, the use factor (set at 0.17% or a gun-shot every 10 minutes and 100% for the aircraft), and the distance used in calculating the combined 8-hour average noise level for comparison to the daytime 65 dBA L_{eq} 8-hour recommended limit (refer also to Appendix A for RCNM worksheet). As indicated in Table 18, the distance radius for noise activity to remain under the recommended limit during the daytime is 900 feet (of which some distance may represent the altitude of the aircraft above the ground). In accordance with Federal Aviation Administration regulations, an aircraft cannot fly below 500 feet near people or structures (FAA 1997). Given a minimum altitude of 500 feet above the ground, the horizontal ground distance equating to a 900-foot separation (the hypotenuse of the triangle representing the airborne aircraft and a receiver on the ground) would be 750 feet. Thus, a minimum of 750 feet should be maintained between a point on the ground beneath an aircraft engaged in aerial shooting and the closest residence to the aircraft. This 750 feet of separation is identified in Table 18.

Table 18. Aerial Shooting Activity – Noise Sources List and Resulting Sound Level

Noise Source	Activity Duration per Site[a]	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance Used to Calculate Receiver Noise Level	Combined Noise Level (L_{eq} 8-Hour)
12-gauge shotgun	10 minutes	0.17	140	750 feet[b]	65
Aircraft	10 minutes	100	92		

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; L_{eq} = equivalent sound level.
[a] To avoid additive sound levels from multiple simultaneous aerial shooting events, such events should not occur closer than 2,400 feet or 0.5 miles apart. A "site" would therefore have a radius of 0.25 miles.
[b] With a minimum aircraft altitude of 500 feet and a minimum separation between plane and ground-based receiver of 900 feet, the horizontal separation distance on the ground would be no less than 750 feet from a point below the aircraft to the nearest adjacent residence.

Table 19 provides the radius distance from aerial shooting activity (supported by aircraft) to sound levels that would remain compliant with the HUD guidance for daytime activity and the WHO guidance for nighttime activity. As shown in Table 19, shooting activity with a gunshot every 10 minutes could occur at a distance of 900 feet or greater during the daytime and remain in compliance with the HUD standard.

Table 19. Aerial Shooting Activity – Minimum Separation Distances to Comply with Noise Criteria

Activity	Horizontal Ground Distance[a] – Daytime per HUD Guidance (65 dBA L_{eq} 8-Hour)	Horizontal Ground Distance[a] – Nighttime per WHO Guidance (45 dBA L_{eq} 8-Hour)	Horizontal Ground Distance[a] – Nighttime per WHO Guidance (60 dBA L_{max})
Aerial shooting	750 feet	2,000 feet	22,000 feet
Aerial shooting with rifle sound suppressor	0 feet	685 feet	6,250 feet

Source: Appendix A, RCNM worksheet.

Notes: HUD = U.S. Department of House and Urban Development; dBA = A-weighted decibels; L_{eq} = equivalent sound level; WHO = World Health Organization; L_{max} = maximum sound level.
[a] Federal Aviation Administration minimum altitude of 500 feet for aircraft included in calculation.

As shown in Table 19, shooting could occur at night, at distances from sensitive receptors of 22,000 feet (approximately 4 miles) or greater and would comply with the established guidelines.

Shooting Activities with Various Firearms and Varying Duration

Reference sound levels for firearms that could be used for shooting activities were obtained from published sound pressure level measurement results of representative individual firearm models discharged at an outdoor firing range by Ammo To Go (2019). The sound level results from Ammo To Go address each gun with and without a sound suppressor. Based upon these published sound levels for various firearms, RCNM was used to quantify the sound levels from shooting activities that use each firearm type. A use factor of 0.11% was used to evaluate each scenario, which equates to one gun firing every 15 minutes across the identified duration period. The parameters used in this analysis are a conservative average and should not be interpreted to restrict WDM activities that might include a grouping of higher-frequency gunshots over a shorter period or wider spacing between events. Four duration scenarios were modeled: 8 hours, 4 hours, 2 hours, and 30 minutes. The sound level was then averaged over 8 hours for comparison to the HUD daytime guidance and WHO nighttime guidance. Modeling was completed for each of three representative firearms with and without a suppressor: 308 caliber rifle, 12-gauge shotgun, and 22 caliber rifle. For the 22 caliber rifle, modeling was also performed for a bolt-action model with integrated sound suppressor, for both supersonic and subsonic ammunition. Modeling was also performed for a popular BB gun (representing an air rifle) for each of the four duration scenarios. Tables 20–27 summarize the RCNM results for the shooting scenarios, and Appendix A contains the spreadsheets with inputs and results.

Daytime Shooting Activities

As indicated in Table 20, under an 8-hour shooting duration, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 1,300 feet to 7,000 feet for representative firearms (approximately 0.25 to 1.3 miles). These distances would be considered prohibitive for shooting activities, and therefore a suppressor should be employed for each firearm and/or the duration of shooting in a given area should be reduced to less than 8 hours. A BB gun (air rifle) could be used as close as 3 feet from a sensitive receptor and and the resulting noise level would still remain below recommended limits. Table 20 also indicates that with a suppressor attached, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 90 feet to 900 feet for representative firearms. Even with the use of a suppressor, 8 hours of shooting with a 308 caliber rifle would exceed the HUD guideline at distances less than 900 feet; shooting with a 12-gauge shotgun would exceed the HUD guideline at distances less than 225 feet; shooting with a 22 caliber rifle would exceed the HUD guideline at distances less than 90 feet. Note that using a bolt-action 22-caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 1 foot from a residence and still maintain compliance with the HUD daytime standard. .

Table 20. Shooting Activity – Firearm Noise Sources and Daytime Receptor Noise Results for 8-Hour Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	With Suppressor Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)
308 caliber rifle	8 hours	0.11	149	7,000 feet	125	900 feet
12-gauge shotgun			140	3,500 feet	113	225 feet
22 caliber rifle			129	1,300 feet	105	90 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	1 foot
Daisy Rider BB gun[a]			73	3 feet	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable.
[a] This would represent any air rifle.

Table 21. Shooting Activity – Firearm Noise Sources and Daytime Receptor Noise Results for 4-Hour Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (Lmax dBA at 50 Feet)	Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	With Suppressor Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)
308 caliber rifle	4 hours	011	149	5,500 feet	125	650 feet
12-gauge shotgun			140	2,700 feet	113	175 feet
22 caliber rifle			129	1,000 feet	105	70 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	1 foot
Daisy Rider BB gun[a]			73	2 feet	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable. [a] This would represent any air rifle.

As indicated in Table 21, under a 4-hour shooting duration, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 1,000 feet to 5,500 feet for representative firearms (approximately 0.2 to 1 mile). These distances would be considered prohibitive for shooting activities, and therefore a suppressor should be employed for each firearm and/or the duration of shooting in a given area should be reduced to less than 4 hours. A BB gun could be used as close as 3 feet from a sensitive receptor and the resulting

noise level would still remain below recommended limits. Table 21 also indicates that with a suppressor attached, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 70 feet to 650 feet for representative firearms. Even with the use of a suppressor, 4 hours of shooting with a 308 caliber rifle would exceed the HUD guideline at distances less than 650 feet; shooting with a 12-gauge shotgun would exceed the HUD guideline at distances less than 175 feet; shooting with a 22 caliber rifle would exceed the HUD guideline at distances less than 70 feet.. Using a bolt-action 22-caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 1 foot from a residence and still maintain compliance with the HUD daytime standard.

Table 22. Shooting Activity – Firearm Noise Sources and Daytime Receptor Noise Results for 2-Hour Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	With Suppressor Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)
308 caliber rifle	2 hours	0.11	149	4,500 feet	125	450 feet
12-gauge shotgun			140	2,200 feet	113	125 feet
22 caliber rifle			129	700 feet	105	50 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	1 foot
Daisy Rider BB gun[a]			73	2 feet	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable.
[a] This would represent any air rifle.

As indicated in Table 22, under a 2-hour shooting duration, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 700 feet to 4,500 feet for representative firearms. These distances would be considered prohibitive for shooting activities, and therefore a suppressor should be employed for each firearm and/or the duration of shooting in a given area should be reduced to less than 2 hours. A BB gun could be used as close as 2 feet from a sensitive receptor and the resulting noise level would still remain below recommended limits.. Table 22 also indicates that with a suppressor attached, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 50 feet to 450 feet for representative firearms. Even with the use of a suppressor, 2 hours of shooting with a 308 caliber rifle would exceed the HUD guideline at distances less than 450 feet; shooting with a 12-gauge shotgun would exceed the HUD guideline at distances less than 125 feet; shooting with a 22 caliber rifle would exceed the HUD guideline at distances less than 50 feet. Using a bolt-action 22-caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 1 foot from a residence and still maintain compliance with the HUD daytime standard.

Table 23. Shooting Activity – Firearm Noise Sources and Daytime Receptor Noise Results for 30-Minute Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	With Suppressor Distance per Daytime HUD Guidance (65 dBA L_{eq} 8-Hour)
308 caliber rifle	0.5 hours	0.11	149	2,750 feet	125	225 feet
12-gauge shotgun			140	1,200 feet	113	70 feet
22 caliber rifle			129	350 feet	105	25 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	1 foot
Daisy Rider BB gun[a]			73	1 foot	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable.
[a] This would represent any air rifle.

As indicated in Table 23, under a 30-minute shooting duration, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 350 feet to 2,750 feet for representative firearms (up to approximately 0.5 miles). These distances would be considered prohibitive for shooting activities, and therefore a suppressor should be employed for each firearm and/or the duration of shooting in a given area should be reduced to less than 30 minutes. A BB gun (air rifle) could be used as close as 1 foot from a sensitive receptor and the resulting noise level would still remain below recommended limits. Table 23 also indicates that with a suppressor attached, the distance from shooting activity to sound levels conforming to the HUD daytime standard would range from 25 feet to 225 feet for representative firearms. Even with the use of a suppressor, 30 minutes of shooting with a 308 caliber rifle would exceed the HUD guideline at distances less than 225 feet; shooting with a 12-gauge shotgun would exceed the HUD guideline at distances less than 70 feet; and, shooting with a 22 caliber rifle would exceed the HUD guideline at distances less than 25 feet. Using a bolt-action 22-caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 1 foot from a residence and still maintain compliance with the HUD daytime standard.

Nighttime Shooting Activities

As indicated in Table 24, under an 8-hour shooting duration, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 7,000 feet to 18,000 feet for representative firearms (approximately 1.3 to 3.4 miles). These distances would be considered prohibitive for shooting activities, and therefore a suppressor should be employed for each firearm, and the duration of shooting in a given area should be reduced to less than 8 hours and/or the activity should be conducted during the daytime. A BB gun (air rifle) could be used as close as 25 feet from a sensitive receptor and the resulting noise level would still remain below recommended limits. Table 24 also indicates that, with a suppressor attached, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 900 feet to 5,200 feet for

representative firearms (up to approximately 1 mile). Even with the use of a suppressor, 8 hours of shooting with a 308 caliber rifle would exceed the WHO nighttime guideline at distances less than 5,200 feet; shooting with a 12-gauge shotgun would exceed the WHO nighttime guideline at distances less than 2,000 feet; and, shooting with a 22 caliber rifle would exceed the WHO nighttime guideline at distances less than 900 feet Using a bolt-action 22-caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 2 feet from a residence and still maintain compliance with the HUD nighttime standard.

Table 24. Shooting Activity – Firearm Noise Sources and Nighttime Receptor Noise Results for 8-Hour Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	With Suppressor Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)
308 caliber rifle	8 hours	0.11	149	18,000 feet	125	5,200 feet
12-gauge shotgun			140	12,500 feet	113	2,000 feet
22 caliber rifle			129	7,000 feet	105	900 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	2 feet
Daisy Rider BB gun[a]			73	25 feet	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable.
[a] This would represent any air rifle.

As indicated in Table 25, under a 4-hour shooting duration, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 5,500 feet to 16,500 feet for representative firearms (approximately 1 to 3 miles). These distances would be considered prohibitive for shooting activities, and therefore a suppressor should be employed for each firearm, and the duration of shooting in a given area should be reduced to less than 4 hours and/or the activity should be conducted during the daytime. A BB gun could be used as close as 17 feet from a sensitive receptor and the resulting noise level would still remain below recommended limits. Table 27 also indicates that with a suppressor attached, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 650 feet to 4,200 feet for representative firearms (up to approximately 0.8 miles). Even with the use of a suppressor, 4 hours of shooting with a 308 caliber rifle would exceed the WHO nighttime standard at distances less than 4,200 feet; shooting with a 12-gauge shotgun would exceed the WHO nighttime standard at distances less than 1,500 feet; shooting with a 22 caliber rifle would exceed the WHO nighttime standard at distances less than 650 feet. Using a bolt-action 22-caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 2 feet from a residence and still maintain compliance with the HUD nighttime standard.

Table 25. Shooting Activity – Firearm Noise Sources and Nighttime Receptor Noise Results for 4-Hour Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	With Suppressor Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)
308 caliber rifle	4 hours	0.11	149	16,500 feet	125	4,200 feet
12-gauge shotgun			140	11,000 feet	113	1,500 feet
22 caliber rifle			129	5,500 feet	105	650 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	2 feet
Daisy Rider BB gun[a]			73	17 feet	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable.
[a] This would represent any air rifle.

Table 26. Shooting Activity – Firearm Noise Sources and Nighttime Receptor Noise Results for 2-Hour Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	With Suppressor Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)
308 caliber rifle	2 hours	0.11	149	14,500 feet	125	3,200 feet
12-gauge shotgun			140	9,500 feet	113	1,100 feet
22 caliber rifle			129	4,500 feet	105	450 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	1 foot
Daisy Rider BB gun[a]			73	12 feet	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable.
[a] This would represent any air rifle.

As indicated in Table 26, under a 2-hour shooting duration, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 4,500 feet to 14,500 feet for representative firearms (approximately 0.8 to 2.7 miles). These distances would be considered prohibitive for shooting activities, and

therefore a suppressor should be employed for each firearm, and the duration of shooting in a given area should be reduced to less than 2 hours and/or the activity should be conducted during the daytime. A BB gun could be used as close as 12 feet from a sensitive receptor and the resulting noise level would still remain below recommended limits. Table 26 also indicates that, with a suppressor attached, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 450 feet to 3,200 feet for representative firearms (up to approximately 0.6 miles). Even with the use of a suppressor, 2 hours of shooting with a 308 caliber rifle would exceed the WHO nighttime standard at distances less than 3,200 feet, shooting with a 12-gauge shotgun would exceed the WHO nighttime standard at distances less than 1,100 feet, and shooting with a 22 caliber rifle would exceed the WHO nighttime standard at distances less than 450 feet. Using a bolt-action 22-caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 1 foot from a residence and still maintain compliance with the HUD nighttime standard.

Table 27. Shooting Activity – Firearm Noise Sources and Nighttime Receptor Noise Results for 30-Minute Shooting Duration

Noise Source	Activity Duration per Site	Use Factor (Percent)	Reference Level (L_{max} dBA at 50 Feet)	Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)	With Suppressor Reference Level (L_{max} dBA at 50 Feet)	w/Suppressor Distance per Daytime WHO Guidance (45 dBA L_{eq} 8-Hour)
308 caliber rifle	0.5 hours	0.11	149	11,000 feet	125	2,000 feet
12-gauge shotgun			140	6,500 feet	113	550 feet
22 caliber rifle			129	2,750 feet	105	225 feet
22 caliber rifle (subsonic ammunition)			N/A	N/A	51	1 foot
Daisy Rider BB gun[a]			73	6 feet	N/A	N/A

Source: Appendix A, RCNM worksheet.
Notes: L_{max} = maximum sound level; dBA = A-weighted decibels; HUD = U.S. Department of House and Urban Development; L_{eq} = equivalent sound level; N/A = not applicable.
[a] This would represent any air rifle.

As indicated in Table 27, under a 30-minute shooting duration, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 2,750 feet to 11,000 feet for representative firearms (approximately 0.5 to 2 miles). These distances would be considered prohibitive for shooting activities, and therefore a suppressor should be employed for each firearm, and the duration of shooting in a given area should be reduced to less than 30 minutes and/or the activity should be conducted during the daytime. A BB gun (air rifle) could be used as close as 6 feet from a sensitive receptor and the resulting noise level would still remain below recommended limits. Table 27 also indicates that with a suppressor attached, the distance from shooting activity to sound levels conforming to the WHO nighttime standard would range from 225 feet to 2000 feet for representative firearms (up to approximately 0.4 miles). Even with the use of a suppressor, 30 minutes of shooting with a 308 caliber rifle would exceed the WHO nighttime standard at distances less than 2,000 feet, shooting with a 12-gauge shotgun would exceed the WHO nighttime standard at distances less than 550 feet, and shooting with a 22 caliber rifle would exceed the WHO nighttime standard at distances less than 225 feet. Using a bolt-action 22-

caliber rifle, integrated sound suppressor, and sub-sonic ammunition, shooting could occur as close as 1 foot from a residence and still maintain compliance with the HUD nighttime standard.

3.2.3 Project Vibration Assessment

3.2.3.1 Vibration Potential of Project Activities

With respect to groundborne vibration, Table 7 provides vibration levels for a pick-up truck, the only equipment with any substantial vibration generation potential likely to be used for any Proposed Project activities. A pickup truck would routinely be employed to transport employees and equipment to carry out activities, as well as for trapped animal removal activities. Using reference levels from Shiferaw (Shiferaw 2021) for this type of equipment, the vibration levels generated by activities were calculated using the Caltrans methodology (Caltrans 2020b). The results of the vibration calculations are presented in Table 28, in comparison to the Caltrans recommended vibration limit of 0.2 in/sec PPV for human annoyance and damage to fragile buildings (Caltrans 2020b).

Table 28. Vibration Levels for Project Activities – Minimum Separation Distances for Compliance

Activity	Minimum Separation Distance to Comply with V Recommended Vibration Limit (0.20 Inches per Second Peak Particle Velocity)
Pickup truck operation[s]	5 feet

Note:
[a] Vehicle driven at 50 mph.

Based on the distances shown in Table 28, the existence of any sensitive buildings located this close to activities would be highly unlikely. In addition, Table 28 shows that safe distances would easily be maintained between vibration-generating activity and buildings/residences where people normally sleep.

3.2.4 Airport Noise Exposure Assessment

3.2.4.1 Airport Noise Exposure from Project Activities

Because the Proposed Project has a statewide scope, certain Project activities would be anticipated to be carried out within areas encompassed by an adopted airport land use plan and/or within 2 miles of a public airport. The Proposed Project would not include development of housing, nor would the Proposed Project be anticipated to directly or indirectly result in the introduction of new residents within such zones that are influenced by airport operations noise levels. However, the Proposed Project could include the use of propane exploders, pyrotechnic devices, rocket nets, cannon nets, and shooting activity to discourage the presence of birds and mammals that present a collision hazard for aircraft operations. An exceedance of recommended limits adopted by WHO could occur if occupied sensitive receptors are located within 650 feet of the airport where the use of propane exploders is proposed; within 400 feet of the airport where the use of pyrotechnic devices is proposed; within 250 feet of the airport where the use of a rocket net or cannon net is proposed; and within 2,000 feet of an airport where shooting activity is proposed (assuming a 308-caliber rifle with suppressor). None of these activities would be anticipated to be conducted during the nighttime at airports.

3.3 Cumulative Noise and Vibration Assessment

Noise-generating activities under the Proposed Project could occur in locations where ambient noise levels are high. Other future projects could also generate noise in proximity to Proposed Project activities. Although noise associated with future projects or operations in proximity to activities may be individually below the applicable criteria, in combination, they could exceed noise criteria. In more extreme cases, ambient conditions or other projects already may exceed the criteria, with Proposed Project activities exacerbating this situation. . It is also anticipated to be rare that noise generated under the Proposed Project would combine with other noise sources to create a situation where applicable standards would be exceeded.

The Proposed Project has virtually no potential to contribute to cumulative vibration levels, as vibration levels with the potential to result in human annoyance would be limited to a distance of 6 feet from any Proposed Project activity. At this distance, it is highly unlikely that other vibration sources would be present in order to exacerbate existing ambient vibration levels.

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Appendix A

Noise Level Calculation Worksheets

noise level limit at residential land use, per HUD guidance =	65
allowable hours over which Leq is to be averaged =	8

Construction Activity	Equipment	Total Equipment Qty	AUF %	Reference Lmax @ 50 ft.	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Pyrotechnics	Screamer Siren	1	1.7	68	Reed-Joseph (https://reedjoseph.com)	400	45.2	0.5	30	15
	CAPA	1	1.7	118	Reed-Joseph (https://reedjoseph.com)	400	95.2	0.5	30	65
							Total for Pyrotechnics Phase:			**65.4**
Stress Sounds	barking dog	1	100	60	Noise Navigator 2013	30	64.3	8	480	64
	crow sqwaking	1	100	47	Noise Navigator 2013	30	51.3	8	480	51
							Total for Stress Sounds Phase:			**64.6**
Propane Exploders	Scare-away LP Gas Cannon	1	27	98	Reed-Joseph (https://reedjoseph.com)	650	70.5	8	480	65
							Total for Propane Exploders Phase:			**64.8**
Chemical Repellents	ATV	1	40	75	RCNM sound level & AUF	35	73.3	3	180	65
	Backpack Sprayer	1	40	58	RCNM sound level & AUF	35	61.0	3	180	53
							Total for Chemical Repellents Phase:			**65.3**
Trapping	ATV	1	40	75	RCNM sound level & AUF	30	79.3	0.5	30	63
	pickup truck	1	40	55	RCNM sound level & AUF	30	59.3	0.5	30	43
	flat-bed truck	1	10	76	RCNM sound level & AUF	30	80.3	0.5	30	58
							Total for Trapping Phase:			**64.5**
Rocket/Cannon Nets	Net Launcher (Shotgun)	2	0.05	126	Shotgun avg. sound level (https://earinc.com)	250	107.0	0.5	30	65
	pickup truck	1	40	55	RCNM sound level & AUF	250	36.0	0.5	30	20
	flat-bed truck	1	10	76	RCNM sound level & AUF	250	57.0	0.5	30	35
							Total for Rocket/Cannon Nets Phase:			**64.9**
Aerial Shooting	12-Gauge Shotgun	1	0.17	140	Ammo-to-go (https://ammotogo.com)	900	109.2	0.17	10.2	65
	airplane	1	100	92	FAA 1997	900	61.2	0.17	10.2	44
							Total for Aerial Shooting Phase:			**64.8**
Aerial Shooting With Suppressor	12 Gauge Shotgun w/suppressor	1	0.17	113	Ammo-to-go (https://ammotogo.com)	100	102.1	0.17	10.2	58
	airplane	1	100	92	FAA 1997	100	81.1	0.17	10.2	64
							Total for Aerial Shooting With Suppressor Phase:			**65.2**
308 Caliber Rifle Shooting Activity										
308 Caliber Rifle - 8 hour activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	7000	94.3	8	480	**65**
308 Caliber Rifle - 4 hour activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	5500	97.9	4	240	**65**
308 Caliber Rifle - 2 hour activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	4500	100.6	2	120	**65**
308 Caliber Rifle - 30 min activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	2750	106.6	0.5	30	**65**
308 Caliber Rifle Shooting Activity - WITH Suppressor										
308 Caliber Rifle - 8 hour activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	900	94.2	8	480	**65**
308 Caliber Rifle - 4 hour activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	650	97.3	4	240	**65**
308 Caliber Rifle - 2 hour activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	450	100.7	2	120	**65**
308 Caliber Rifle - 30 min activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	225	106.9	0.5	30	**65**

noise level limit at residential land use, per HUD guidance =	65
allowable hours over which Leq is to be averaged =	8

Construction Activity	Equipment	Total Equipment Qty	AUF %	Reference Lmax @ 50 ft.	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
12-Gauge Shotgun Shooting Activity										
12-Gauge Shotgun - 8 hour activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	3500	94.8	8	480	**65**
12-Gauge Shotgun - 4 hour activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	2700	97.9	4	240	**65**
12-Gauge Shotgun - 2 hour activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	2200	100.1	2	120	**65**
12-Gauge Shotgun - 30 min activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	1200	106.4	0.5	30	**65**
12-Gauge Shotgun Shooting Activity - WITH Suppressor										
12-Gauge Shotgun - 8 hour activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	225	94.9	8	480	**65**
12-Gauge Shotgun - 4 hour activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	175	97.1	4	240	**65**
12-Gauge Shotgun - 2 hour activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	125	100.1	2	120	**65**
12-Gauge Shotgun - 30 min activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	70	105.2	0.5	30	**64**
22 Caliber Rifle Shooting Activity										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	1300	94.6	8	480	**65**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	1000	97.2	4	240	**65**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	700	100.6	2	120	**65**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	350	106.9	0.5	30	**65**
22 Caliber Rifle Shooting Activity - WITH Suppressor (Silencer Central)										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	90	95.0	8	480	**65**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	70	97.2	4	240	**65**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	50	100.2	2	120	**65**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	25	106.2	0.5	30	**65**
22 Caliber Rifle Shooting Activity - WITH Suppressor & Supersonic Ammo (USDA)										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	1	89.2	8	480	**60**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	1	89.2	4	240	**57**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	1	89.2	2	120	**54**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	1	89.2	0.5	30	**48**
22 Caliber Rifle Shooting Activity - WITH Suppressor & Subsonic Ammo (USDA)										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	1	80.2	8	480	**51**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	1	80.2	4	240	**48**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	1	80.2	2	120	**45**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	1	80.2	0.5	30	**39**
Daisy Rider BB Gun Shooting Activity										
Daisy Rider BB Gun - 8 hour activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	3	92.6	8	480	**63**
Daisy Rider BB Gun - 4 hour activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	2	96.2	4	240	**64**
Daisy Rider BB Gun - 2 hour activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	2	96.2	2	120	**61**
Daisy Rider BB Gun - 30 min activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	1	102.2	0.5	30	**61**

noise level limit at residential land use, per WHO guidance =	45
allowable hours over which Leq is to be averaged =	8

Construction Activity	Equipment	Total Equipment Qty	AUF %	Reference Lmax @ 50 ft.	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Pyrotechnics	Screamer Siren	1	1.7	68	Reed-Joseph (https://reedjoseph.com)	3000	24.6	0.5	30	-5
	CAPA	1	1.7	118	Reed-Joseph (https://reedjoseph.com)	3000	74.6	0.5	30	45
							Total for Pyrotechnics Phase:			**44.9**
Distance to Achieve 60 dBA Lmax for loudest Source	CAPA	1	1.7	118	Reed-Joseph (https://reedjoseph.com)	8500	60.1			
Stress Sounds	barking dog	1	100	60	Noise Navigator 2013	200	44.0	8	480	44
	crow sqwaking	1	100	47	Noise Navigator 2013	200	31.0	8	480	31
							Total for Stress Sounds Phase:			**44.2**
Propane Exploders	Scare-Away LP Gas Cannon	1	27	98	Reed-Joseph (https://reedjoseph.com)	4000	51.1	8	480	45
							Total for Propane Exploders Phase:			**45.4**
Distance to Achieve 60 dBA Lmax for loudest Source	Scare-Away LP Gas Cannon	1	27	98	Reed-Joseph (https://reedjoseph.com)	2000	59.2			
Chemical Repellents	ATV	1	40	75	RCNM sound level & AUF	350	52.9	3	180	45
	Backpack Sprayer	1	40	58	RCNM sound level & AUF	350	36.4	3	180	28
							Total for Chemical Repellents Phase:			**44.8**
Trapping	ATV	1	40	75	RCNM sound level & AUF	180	60.1	0.5	30	44
	pickup truck	1	40	55	RCNM sound level & AUF	180	40.1	0.5	30	24
	dump truck	1	10	76	RCNM sound level & AUF	180	59.9	0.5	30	38
							Total for Trapping Phase:			**45.0**
Rocket/Cannon Nets	Net Launcher (Shotgun)	2	0.05	126	Shotgun avg. sound level (https://earinc.com)	2000	87.2	0.5	30	45
	pickup truck	1	40	55	RCNM sound level & AUF	2000	16.2	0.5	30	0
	dump truck	1	10	76	RCNM sound level & AUF	2000	37.2	0.5	30	15
							Total for Rocket/Cannon Nets Phase:			**45.1**
Distance to Achieve 60 dBA Lmax for loudest Source	Net Launcher (Shotgun)	2	0.05	126	Shotgun avg. sound level (https://earinc.com)	13000	59.9			
Aerial Shooting	12-Gauge Shotgun	1	0.17	140	Ammo-to-go (https://ammotogo.com)	5280	89.4	0.17	10.2	45
	airplane	1	100	92	FAA 1997	5280	41.4	0.17	10.2	25
							Total for Aerial Shooting Phase:			**45.1**
Distance to Achieve 60 dBA Lmax for loudest Source	12 Gauge Shotgun	1	0.17	140	Ammo-to-go (https://ammotogo.com)	22000	60.3			
Aerial Shooting With Suppressor	12 Gauge Shotgun w/suppressor	1	0.17	113	Ammo-to-go (https://ammotogo.com)	950	81.7	0.17	10.2	37
	airplane	1	100	92	FAA 1997	950	60.7	0.17	10.2	44
							Total for Aerial Shooting With Suppressor Phase:			**44.8**
Distance to Achieve 60 dBA Lmax for loudest Source	12 Gauge Shotgun w/suppressor	1	0.17	113	Ammo-to-go (https://ammotogo.com)	6250	60.0			
308 Caliber Rifle Shooting Activity										
308 Caliber Rifle - 8 hour activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	18000	75.1	8	480	**45**
308 Caliber Rifle - 4 hour activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	16500	77.3	4	240	**45**
308 Caliber Rifle - 2 hour activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	14500	80.5	2	120	**45**
308 Caliber Rifle - 30 min activity	308 Caliber Rifle	1	0.11	149	Ammo-to-go (https://ammotogo.com)	11000	86.4	0.5	30	**45**

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Construction Activity	Equipment	Total Equipment Qty	AUF %	Reference Lmax @ 50 ft.	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
308 Caliber Rifle Shooting Activity - WITH Suppressor										
308 Caliber Rifle - 8 hour activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	5200	74.7	8	480	**45**
308 Caliber Rifle - 4 hour activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	4200	77.5	4	240	**45**
308 Caliber Rifle - 2 hour activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	3200	80.9	2	120	**45**
308 Caliber Rifle - 30 min activity	308 Caliber Rifle w/suppressor	1	0.11	125	Ammo-to-go (https://ammotogo.com)	2000	86.2	0.5	30	**45**
12-Gauge Shotgun Shooting Activity										
12-Gauge Shotgun - 8 hour activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	12500	74.7	8	480	**45**
12-Gauge Shotgun - 4 hour activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	11000	77.4	4	240	**45**
12-Gauge Shotgun - 2 hour activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	9500	80.1	2	120	**45**
12-Gauge Shotgun - 30 min activity	12-Gauge Shotgun	1	0.11	140	Ammo-to-go (https://ammotogo.com)	6500	86.4	0.5	30	**45**
12-Gauge Shotgun Shooting Activity - WITH Suppressor										
12-Gauge Shotgun - 8 hour activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	2000	74.2	8	480	**45**
12-Gauge Shotgun - 4 hour activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	1500	77.2	4	240	**45**
12-Gauge Shotgun - 2 hour activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	1100	80.3	2	120	**45**
12-Gauge Shotgun - 30 min activity	12-Gauge Shotgun w/suppressor	1	0.11	113	Ammo-to-go (https://ammotogo.com)	550	86.8	0.5	30	**45**
22 Caliber Rifle Shooting Activity										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	7000	74.3	8	480	**45**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	5500	77.9	4	240	**45**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	4500	80.6	2	120	**45**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle	1	0.11	129	Ammo-to-go (https://ammotogo.com)	2750	86.6	0.5	30	**45**
22 Caliber Rifle Shooting Activity - WITH Suppressor (Silencer Central)										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	900	74.2	8	480	**45**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	650	77.3	4	240	**45**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	450	80.7	2	120	**45**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle w/suppressor	1	0.11	105	Ammo-to-go (https://ammotogo.com)	225	86.9	0.5	30	**45**
22 Caliber Rifle Shooting Activity - WITH Suppressor and Supersonic Ammo (USDA)										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	6	73.6	8	480	**44**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	4	77.1	4	240	**45**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	3	79.6	2	120	**44**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle w/suppressor	1	0.11	60	Ammo-to-go (https://ammotogo.com)	2	83.2	0.5	30	**42**
22 Caliber Rifle Shooting Activity - WITH Suppressor and Subsonic Ammo (USDA)										
22 Caliber Rifle - 8 hour activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	2	74.2	8	480	**45**
22 Caliber Rifle - 4 hour activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	2	74.2	4	240	**42**
22 Caliber Rifle - 2 hour activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	1	80.2	2	120	**45**
22 Caliber Rifle - 30 min activity	22 Caliber Rifle w/suppressor	1	0.11	51	Ammo-to-go (https://ammotogo.com)	1	80.2	0.5	30	**39**

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Construction Activity	Equipment	Total Equipment Qty	AUF %	Reference Lmax @ 50 ft.	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Daisy Rider BB Gun Shooting Activity										
Daisy Rider BB Gun - 8 hour activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	25	74.2	8	480	**45**
Daisy Rider BB Gun - 4 hour activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	17	77.6	4	240	**45**
Daisy Rider BB Gun - 2 hour activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	12	80.6	2	120	**45**
Daisy Rider BB Gun - 30 min activity	Daisy Rider BB Gun	1	0.11	73	Ammo-to-go (https://ammotogo.com)	6	86.6	0.5	30	**45**