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Application
November 19, 2021

3

Adirondack Park Agency, Division of Regulatory Programs

Application for Commercial and/or Industrial Uses

Submitted by Unconventional Concepts, Inc.

RECEIVED
ADIRONDACK PARK AGENCY
NOV 19 2021

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Completed Application Form: Application for Commercial and/or Industrial uses

Local Government Notice Form

Attachment B: List of Landowners with Property Adjacent to the Project Site

Supplement 1: UCI's detailed responses to various application questions

Attachment A: Deed

Attachment D: Maps of the Project Site

Attachment F: Deed Restrictions and Easements

Attachment J: APA response regarding construction of a Quonset hut by Unconventional Concepts

Attachment K: JIF from Unconventional Concepts, regarding construction of ballistics test range

Attachment L: JIF Sketch Map

Attachment M: APA response to JIF from UCI, regarding construction of a ballistics test range

ADIRONDACK PARK AGENCY Division of Regulatory Programs PO Box 99, 1133 NYS Route 86 Ray Brook, New York 12977 Telephone (518) 891-4050 www.apa.ny.gov	NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency RECEIVED ADIRONDACK PARK AGENCY NOV 19 2021	APPLICATION FOR COMMERCIAL AND/OR INDUSTRIAL USES

Applicability: This application is for an Adirondack Park Agency permit for new or expanded commercial uses and/or industrial uses. Commercial uses include stores, offices, lodging facilities, warehousing and distribution facilities, commercial maintenance facilities, tourist attractions, recreational facilities available for a fee, and other types of retail or commercial service establishments. Industrial uses include the manufacturing, production or assembly of goods or materials and associated waste disposal areas. It is the appropriate application for saw mills, pallet mills, chipping mills and similar wood using facilities. Please note that for a new commercial use in an existing commercial use structure, General Permit 2010G-3 is available and may be applicable.

Instructions: Please answer all of the questions in each numbered section and provide all applicable attachments. Questions 31-35 need only be answered for industrial uses as instructed. Type or print clearly in ink. **Submit <u>three</u> completed copies of this application and all required attachments to the Agency at the above address.** A site visit by Agency staff will also be required. The Agency may also request additional information based on the information contained in the application.

The Adirondack Park Agency Act provides that the time period for the review of this project will not begin to run until the Agency determines that the application is complete. If the application is not complete, a request for additional information will be issued within 15 days of receipt of the application, indicating which information is still required for a complete application. The proposed project may not be undertaken until an Agency permit has been issued.

Assistance: For assistance in completing this application or to request a pre-application meeting, please contact the Agency's Regulatory Programs division at the above address/telephone number and/or refer to the Agency's website.

1. Project Sponsor(s)*:

Name(s): Michael Hopmeier

Mailing Address: 1620 Herndon Parkway, Ste 120A
Herndon, VA 20170

Telephone (Daytime): 703 870 7211

Fax/E-mail: hopmeier@unconventional-inc.com

2. Current Property Owner(s):** (if different than Project Sponsor)

Name(s): James Pulsifer, heir of Philip Pulsifer

Mailing Address: PO Box 27
Lewis, NY 12950

Telephone (Daytime): 518-593-5678

Fax/E-mail: no email or fax

* A project sponsor is a person having legal interest in property who makes application to the Agency for the review of a project proposed on such property. Documentation demonstrating such legal interest must be provided such as a current deed or purchase contract.

** List all names on the current deed of record.

3. **Project Sponsor's Authorized Representative:**

By filling in the name and address below and signing this application, the project sponsor is authorizing the person named below to act as his/her agent in all matters relating to this permit application before the Adirondack Park Agency. The project sponsor acknowledges that all contact regarding the application will be through his/her Authorized Representative. The project sponsor is, however, ultimately responsible for the accuracy of the information contained in this application and for compliance with all terms and conditions of any permit issued to him/her by the Agency.

Name: Michael Hopmeier
Mailing Address: 1620 Herndon Parkway, Ste. 120 A. Herndon, VA 20170
Telephone (daytime): 703 870 7211 Fax/E-mail: hopmeier@unconventional-inc.com

4. **Project Site Location/Identification** (a project site is generally considered to be all adjoining properties owned by the current landowner(s) including properties separated by a public road):

Road/Highway: Hale Hill Lane
Nearby Waterbody: _____
Town(s): Lewis, NY County: Essex
Size: _____ acres

Tax Map Designation (from the tax bill for the property):
Section: _____ Block: _____ Parcel: 38.1-1-31.000
Section: _____ Block: _____ Parcel: _____
Section: _____ Block: _____ Parcel: _____

5. **Project Sponsor's Legal Interest in Project Site** (check the one that applies):

____ owner _____ signed purchase agreement holder
__x__ lessee _____ option holder _____ other (Identify: _____)

6. **Subdivision of Land:**

Will the project require the subdivision of land to create the building lot or building site?
__x__ No
_____ Yes. If yes, answer the following:

What is the size of all lots to be created?

Lot #1 _____ acres Lot #2 _____ acres *Lot #3 _____ acres
(*May require separate application for 3 to 15 Lot Subdivisions)

7. **Prior Agency Contact:**

a) Has there been any previous contact or discussions with Agency staff regarding this project or project site, or has Agency staff visited the project site?
____No
__x__Yes. Staff person's name: Brian Ford | Dan Kelleher
Date of contact: Aug., 2021 | Sept. 2021

b) Has the project or project site been the subject of a past Agency action (e.g., permit, variance, jurisdictional inquiry, enforcement case or wetland flagging)?
_X_ No
____ Yes. If yes, provide the number and date:

Permit/Variance/Order Number: _____ date: _____
Jurisdictional Inquiry Number: _____ date: _____
Enforcement Case Number: _____ date: _____
Wetland Boundary Flagging*: _____ date: _____

*** If possible, seek consultation with Agency staff regarding the potential location of wetlands on the project site prior to submitting application form.**

PROJECT PROPOSAL

8. Detailed Project Description: detailed response; provided as a separate document.

a) Provide a detailed written description of the intended commercial/industrial activities or services to be provided:

b) Provide a detailed written description of the major site development elements of the project (e.g., new building, parking for 32 cars):

c) Provide a detailed written description of the need for the selected project design and describe what, if any alternatives were considered and the reasons for rejection of each alternative:

9. Operational Maintenance of the Site:

Identify who will be responsible for the operational maintenance of the commercial/industrial use:

Name: Michael Hopmeier
Address: 1620 Herndon Parkway, Ste. 120A, Herndon, VA 20170
Telephone Number: 703-870-7211

10. Periods of Operation:

a) Describe the hours, days of the week and seasons that you plan to operate your facility at the initial period of full operation:

Periodically, with a minimum of one week's notice; operation generally not to exceed 10 hours per week, all seasons.

b) If you anticipate expanding your periods of operation within the next five years, please describe the probable future hours, days of the week and seasons that you may operate the facility:

not anticipated

11. Planned Level of Activity at Full Operation: not applicable

Complete the following table for anticipated numbers of customers/visitors at full operation.

Customers/Visitors	Spring	Summer	Fall	Winter
Maximum Number/Day				
Average Daily Total				
Season Total				

12. Traffic:

Complete the table for anticipated traffic at full operation during the busiest season. not applicable

Traffic	Monday to Friday	Saturday and Sunday
Peak Hours of Traffic		
Number of Cars/Trucks at Peak Period		
Number of Buses at Peak Period		

13. Deliveries and Shipments:

Will your facility be shipping or receiving any raw materials, supplies or other goods or products?

__X__ No

____ Yes. If yes, please answer the following questions:

a) Type of materials, supplies or goods to be shipped/received: _____

_____

b) Type of shipping/delivery vehicles: _____

c) Average number of deliveries per day: _____

d) Hour of earliest delivery: _____

e) Hour of latest delivery: _____

f) Type and number of delivery vehicles that will stay on site overnight: _____

_____

g) Location on site where deliveries will be received: _____

_____

h) Location on site where deliveries will be stored: _____

_____

14. **Project Employment and Other Benefits:**

a) Construction: Describe the number of persons that will be employed in constructing the project and the average number of weeks workers will be employed:

not applicable

Part-time _____ Avg. # Weeks _____
Full-time _____ Avg. # Weeks _____

Please provide the anticipated payroll during construction: _____

b) Operation/Occupancy: Describe the number of proposed part-time and full-time year-round and seasonal employees at full operation:

not applicable

Year-round:
Part-time _____ Avg. # Weeks _____
Full-time _____ Avg. # Weeks _____
Seasonal:
Part-time _____ Avg. # Weeks _____
Full-time _____ Avg. # Weeks _____

Please provide the anticipated payroll at full operation/occupancy: $300,000.00

c) Commercial, industrial, residential, recreational as well as other benefits may be derived by a project. For example, a new commercial/industrial use might provide benefits to the community by filling a need for specific goods or services not currently available, providing goods or services that support existing commercial/industrial uses, or generating economic growth by promoting the need for additional new commercial/industrial uses. Please describe any potential benefits to be derived from the project including general service improvements to the community:

detailed response provided in a separate document.

15. **Real Property Tax:**

a) What is the current assessment of the project property? $ ~~taken in~~ $125,500.00 us

b) Are any tax abatements proposed?

___No
_x_Yes The 480-A New York Forest Tax Law Program is currently in effect for the site at 195 Hale Hill Lane, effective as of 2020.

16. **Project Costs:**

Provide approximate cost estimates for the proposed project, including:

a) site acquisition costs (if any): NA.
b) annual lease costs (if applicable): $1,000.00
c) construction costs for site access and preparation, construction of principal buildings and associated accessory structures, parking areas, utilities, and other site development: $100,000.00
d) annual maintenance and operation costs: $100,000.00

17. Site Plan Map:

A detailed, to-scale Site Plan Map is required for each commercial/industrial use application. The Site Plan Map may be combined with the survey or deed plot required by Section 38, as **ATTACHMENT D.** Site Plan Maps should be prepared by an appropriately qualified person to so act in the State (i.e., licensed surveyor, engineer, architect or landscape architect). The Site Plan Map is the best way to show what you propose to do on the project site.

Provide a Site Plan Map drawn to scale of one inch equals 20 or 40 feet, which is clearly labeled with the map scale, north arrow, date of preparation and name of preparer. Show and label all of the following within the proposed project limits for each area of proposed construction:

a) Existing Conditions:

Natural resources, including all:

1) waterbodies, including ponds, rivers and permanent and intermittent streams; NA
2) wetlands (to be delineated by Agency staff or by trained professionals with review by Agency staff); Attachment D, slides 3, 4
3) floodplain boundaries and elevation of the 100-year floodplain; slides 5, 6
4) areas of bedrock at or near the surface; slide 7
5) boundaries of existing vegetation cover types (e.g., forested, field, agricultural); slide 8
6) topographic contours at 2-foot intervals; not included, outside UCI capabilities
7) natural swales and drainage features; and NA, none on property
8) any special plant or animal habitats contained on the NYSDEC Natural Heritage database. slides 9, 10

Existing human-made resources, including all:

1) principal and accessory buildings (label size, use and materials); slides 2, 12, blue pin
2) retaining walls, fencing and other structures; NA, none on property
3) public roadways, bridges, railroads, and parking lots (label size and materials); NA
4) intersecting private roadways and driveways (label size and materials); slide 11
5) sidewalks, stairways and other pedestrian facilities (label size and materials); NA
6) boat docks, fishing piers and other waterfront facilities (label size and materials); NA
7) culverts, headwalls, ditches, settling basins and other stormwater management facilities (label size and materials); NA
8) overhead and underground public utilities located within the right-of-way (ROW); NA
9) guide rails and signs; and NA
10) property lines, lot lines and easement lines, and ROW lines of all municipal, county and State highways. NA; does not abut state or county highways

b) Proposed Conditions, including all:

1) new principal and accessory buildings (label use, size, and materials); NA, none planned
2) retaining walls, fencing and other structures (label size and materials); NA
3) all new roadway and parking areas (label size and materials); NA
4) new sidewalks, stairways and other pedestrian facilities (label size and materials); NA
5) proposed property lines, lot lines, and easement lines; NA
6) construction limit lines; see attachment L, Sketch Map, and Supplement 1.
7) grading limit lines and final grading shown at 2-foot intervals; NA
8) permanent stormwater management facilities (label size and materials); NA

9) new or relocated private and public utilities; NA
10) new guide rails and signs; NA
11) fuel and bulk chemical storage and dispensing facilities; NA
12) docks, bulkheads, piers and other waterfront facilities; NA
13) temporary access roads and work pads; NA
14) temporary stream diversions; NA
15) limits of vegetative cutting; and See Attachment L, Sketch Map, and Supplement 1.
16) new landscape development, limits of wetland fill and wetland mitigation areas. NA

PROJECT DETAILS

18. Proposed Construction and Operation Dates:

a) Estimated Start of Construction Date: 1 April 2022
b) Estimated Construction Completion Date: 1 July 2022
c) Estimated Start of New or Expanded Commercial/Industrial Use Date: 1 July 2022

19. Proposed Site Access:

a) Describe the location, type of material, and size of any proposed temporary construction access drives to the project site:

__X__ No temporary access drives

b) Describe the location, type of material, and size of any proposed permanent roads and driveways within the project site:

detailed response, see Supplement 1.

c) Will the project require a highway work permit from county transportation departments or New York State Department of Transportation (NYSDOT)?

__X__ No
_____ Yes. If yes, provide plans, details and specifications for all temporary and permanent roads and driveways. Attach a copy of the county or NYSDOT Highway Work Permit if one is required.

20. Proposed Buildings and Structures:

a) Are there buildings on the total contiguous landholding now owned by the present landowner?

_____ No
__X__ Yes. If yes, provide the following information (attach additional sheets if necessary):

Date of Construction	Size (square feet)	Height (feet)	Type/Use (e.g., rental cabin, store, warehouse)
1962	1,084	1-story bldg	seasonal use hunting cabin

Describe any other structures which existed on the property as of August 1, 1973 which have since been removed or destroyed and their use (e.g., residential, commercial). Include the date that the structure was removed or destroyed:

__X__ Check if no buildings or structures have been removed or destroyed since August 1, 1973.

b) Will any buildings or other structures be demolished, replaced or constructed new as part of this project?

__X__ No

_____ Yes. If yes, describe:

c) Provide construction plans and details for all proposed commercial, industrial, warehouse, storage and other accessory buildings; bulkheads, piers, docks or other waterfront facilities; or fencing, sidewalks, stairways or retaining walls that will be constructed as part of the project. Show plans and elevations and label dimensions, construction materials and exterior colors. NA

21. Exterior Parking:

a) Describe the number and location of *existing* vehicle, boat, trailer, or airplane parking spaces on the existing property:

NA

b) Describe the number and location of all *proposed* vehicle, boat, trailer or airplane parking spaces:

NA

c) Show and label all existing and proposed parking areas on a separate parking plan or on the Site Plan Map. Provide construction plans and details for all parking areas.

NA

22. Proposed Outside Storage:

Will the project involve outside storage of inoperable vehicles, construction materials, equipment, raw materials or finished goods after the project is constructed?

_____ No

__x__ Yes. If yes, describe the type and location of materials or objects to be stored:

approximately 100 tons of Item 4 gravel from nearby gravel pit

23. Fuel Storage and Handling:

Will the project involve the storage and dispensing of motor, heating, or jet fuels, process chemicals and/or raw materials?

__x__ No

_____ Yes. If yes, provide the following information: NA

a) Describe the type, volume, method of storage and manner in which fuels, process chemicals and/or raw materials will be dispensed (e.g., material will be stored in closed aboveground silos and will be pumped into the industrial plant via pipes) and location of all fuel and bulk chemical storage and dispensing facilities:

b) Provide plans and details for all fuel storage and dispensing facilities. Show and label the facilities on the Site Plan Map. If applicable, provide a copy of the NYSDEC Tank Registration for each tank.

24. Wastewater Treatment Systems:

a) Type of existing system:

__x__ None

____ Community

____ Municipal (Operating Entity) _____

Existing wastewater flows_____ gallons/day

____ Individual on-site system

Describe type and size of existing absorption area: NA

b) Type of new, replacement or expanded wastewater treatment system:

__x__ None

____ Community

____ Municipal (Operating Entity) _____

____ Individual on-site system

Describe type and size of system: NA

c) Provide detailed plans for any new, replacement or expanded wastewater treatment system(s) prepared by an engineer licensed in the State of New York. If an on-site system is proposed and unless otherwise instructed by Agency staff, show at a minimum: not applicable

1) soils test pit location and data;
2) percolation test hole location and results taken within the proposed absorption area(s);
3) details on design of the system (application rate and number of bedrooms, etc.);
4) size and type of septic tank;
5) pumping station (if necessary);
6) distribution box; and
7) soil absorption system.

25. Proposed Water Supply Systems:

a) Type of existing system:

__X__ None
____ Community
____ Municipal (Operating Entity) _____
____ Individual on-site system

b) Type of new, replacement or expanded system:

__X__ None
____ Community
____ Municipal (Operating Entity) _____
____ Individual on-site system

c) Show and label on the Site Plan Map the location of any on-site well or, if a community or municipal system, the distribution piping. not applicable

26. Other Public Utilities:

a) Type of other existing utilities: none

____ Natural Gas (Operating Entity) _____
____ Electric (Operating Entity) _____
____ Telephone (Operating Entity) _____
____ Other (Operating Entity) _____

b) Type of new, replacement or expanded system: n

__X__ None
____ Type _____ (Operating Entity)_____
____ Type _____ (Operating Entity)_____

c) Show and label on the Site Plan Map all existing and proposed public utilities.

not applicable

27. Exterior Lighting:

Will the project involve new exterior site lighting that will be freestanding or attached to existing or proposed buildings?

__X__ No

_____ Yes. If yes, provide a Lighting Plan as follows: NA

a) Show the location of and label all exterior light fixtures on the Site Plan Map or on a separate to-scale lighting or utility plan.

b) Provide plan and elevation views and construction details of all freestanding light standards. Show the foundation, the light standard, the light fixtures, and any shielding that will restrict projected light from being seen off-site.

c) Provide manufacturers specifications and details describing:
   1) the size, color, and type of light standards and light fixtures;
   2) bulb types and wattages;
   3) surface area lit by each light; and
   4) shields and reflectors.

28. Exterior Signing:

Will the project involve any new exterior signing? ~~NA~~ no

__X__ No

_____ Yes. If yes, provide a Sign Plan as follows (the sign plan must comply with 9 NYCRR Appendix Q-3 – Standards for Signs Associated with Projects): NA

a) Show and label on the Site Plan Map, or on a separate Sign Plan, the number, location, and orientation of all exterior signs.

b) Provide to-scale details and specifications for each proposed outdoor sign that includes at a minimum:
   1) width and height from ground surface to top of each sign;
   2) construction details and materials;
   3) proposed text, color scheme, logos or other graphics; and
   4) details of any raised foundations, planters or retaining walls.

29. Proposed Landscape Development:

Will the project involve landscape development (e.g., planting of trees and shrubs for screening, aesthetics or erosion control or establishment of turf areas)?

__X__ No

_____ Yes. If yes, provide a Planting Plan as follows: NA

a) Provide and label on the Site Plan Map or a separate plan the location of all proposed planting. Provide a keyed list that provides the species and common names, sizes, and whether the plants are nursery grown or field collected. (Note: The planting plan should only include native species or ornamental plants commonly found in the vicinity of the project site).

b) Provide specification, typical planting details, and seed mixes for temporary and permanent grassed areas.

c) Provide a plan for maintenance and care of all plantings during the initial period of establishment and during the post-construction warranty period.

30. Use of Herbicides, Pesticides, Fertilizers, Sand and Salt:

Will the operation of the project involve the use of herbicides, pesticides, fertilizers, sand or salt?

_____ No
__x__ Yes. If Yes, please provide the following information:

a) Describe the type, proposed areas of use, storage and handling of all products:
use of herbicides to control unrestricted undergrowth

Please note! UCI will use only generally accepted, commercially available products.

b) If using herbicides or pesticides, provide copies of all product labels.
information not currently available; products have not been selected

INDUSTRIAL USES [1]: (answer questions 31-35)

31. Operating Profile - Products and By-products:

a) Describe the primary product(s) to be created through this industrial activity:

research and development supporting national security missions.

b) What are the anticipated volumes of production in numbers of units, tons, cases or other measures?

NA

c) Will there be salable by-products? If yes, please describe and provide anticipated volumes:

NA

d) Provide an overview of the production process:

NA.

32. Operating Profile - Raw Materials and Process Materials:

a) What raw materials will be used in production and in what volumes?

NA

b) What process chemicals or other process materials will be used in production and in what volumes? NA

[1] Industrial uses include the manufacturing, production or assembly of goods or materials and associated waste disposal areas. These questions should also be answered for saw mills, pallet mills, chipping mills and similar wood using facilities.

c) Will the production process involve the use of water and/or process heat? If so, provide details:

NA

33. Operating Profile - Waste Materials:

a) What liquid and/or solid wastes will be produced as a result of production? In what volumes?

NA

b) Detail how wastes will be stored and disposed of. Any outside storage or disposal facilities should be shown on the Site Plan Map.

NA

c) Indicate whether you have applied for a NYS Department of Environmental Conservation (NYSDEC) Article 19 air pollution control permit, an Article 17 SPDES (water discharge) permit, or any other permits (if required).

~~NA~~ no

34. Operating Profile – Machinery:

a) Provide a list of all major installed and mobile equipment and the noise decibel levels of each.

detailed response, see Supplement 1

b) Identify on the Site Plan Map the expected operating location(s) of any outside mobile equipment and any installed equipment with through-the-wall openings to the outside (e.g., debarkers or chippers). see Supplement 1.

35. Operating Profile - Periods of Operation:

a) Indicate the expected hours of operation and number of days per week that the facility is expected to operate.

detailed response, see Supplement 1.

b) How many work shifts are anticipated? Indicate the expected starting hour for each.

detailed response, see Supplement 1.

c) Are changes in numbers of shifts, overall operating hours, or number of operating days expected as the operation matures?

no changes anticipated.

PROJECT SITE DOCUMENTATION

36. Deed(s):

Provide, as **Attachment A**, a complete copy of the current recorded deed(s) for the project site containing the recording information. Copies are available from the County Clerk's Office. Also, if the project sponsor has an executed contract or agreement to purchase or lease the project site, please provide a copy of it in order to establish the sponsor's legal interest in the project site. (The purchase price and other confidential information may be blackened out.)

included

37. Adjacent Properties:

Provide, as **Attachment B**, a complete and current list of the names and addresses of all landowners whose property adjoins the project site with the tax map references (tax map section, block, and parcel numbers) based on the latest completed tax assessment roll. This list must include landowners whose property would otherwise adjoin the project site but is located across a public road or right-of-way from the site. Attached is a sheet which should be used to provide the required list of adjoining landowners. (This information is typically available from the Real Property Tax Services at County Offices or from the Town/Village assessors.)

included

38. Project Site History:

As part of its review of the project, Agency staff must understand the history of the project site. If the project site was part of a larger parcel on May 22, 1973 (the enactment date of the Adirondack Park Agency Land Use and Development Plan), the exact property boundaries of the larger parcel and the size of all buildings on that date must be established.

property transferred to Philip Pulsifer in 1956 - question is not applicable

a) State the current acreage of all connected lands owned by the current landowner, even if the parcels have different deeds and/or tax map numbers and even if larger than the project site: _____acres NA

b) As of May 22, 1973, did the owner at that time own any adjoining property, including properties on the opposite sides of public roads? NA

_____ No

_____ Yes. If yes, provide the Tax Map References of these adjoining properties:

Section: _____Block: _____Parcel:_____

Section: _____Block: _____Parcel:_____

Section: _____Block: _____Parcel:_____

c) Has any portion of the total as it existed on May 22, 1973 been conveyed, sold, given away or otherwise subdivided since that date? NA

_____ No

_____ Yes. If yes, provide the following information for those lots or parcels (Use a separate 8-1/2"x11" paper if necessary):

Lot Number (from current tax map)	Date of Conveyance	Lot Size (sq. ft. or acres)	Was Conveyance by Gift or Sale?

Provide, as **Attachment C,** a complete copy of all recorded deeds (not just abstracts) for the above conveyances back through May 22, 1973.

Provide, as **Attachment D**, a full scale copy of a survey map or the current real property tax map clearly showing the property boundaries of the project site and any tax parcel or lot that the project site was part of on May 22, 1973.

39. Deed Restrictions and Easements:

Describe and provide, as **ATTACHMENT E,** any current deed restrictions or easements associated with the project site. none noted.

Attach, as **ATTACHMENT F**, any proposed deed language that will restrict further subdivision or development on the project site and any other proposed deed restrictions or easements. See attachment F.

PROJECT SITE RESOURCES

40. Historic Resources:

Does the project site have any buildings that are more than 50 years old, or does the project site or surrounding area contain any structures or districts which are listed or deemed eligible to be listed on the State or National Register of Historic Places or does the project site involve any known archeological resources?

__X__ No

_____ Yes to any of the above criteria

If yes, provide a location map, project description, site plan map, and recent photographs keyed to the location map, which the Agency will then submit to the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) as part of consultation required by the State Historic Preservation Act. Please be advised that the Agency cannot deem an application as complete until the OPRHP's determination and/or recommendations for historic resource impact mitigation have been provided to the Agency.

NA

41. Character of the Area/Adjoining Land Uses:

Describe the natural and human made character of the nearby and adjoining land uses including the type and density of existing commercial, industrial and residential development, roads, State lands, and public recreation /open space recreational facilities (e.g., hiking trails, boat launches):

undeveloped moderately wooded land w/no adjacent development.

42. Shoreline:

Shoreline means that line at which land adjoins waters of lakes or ponds or navigable (by boat or canoe) rivers and streams. There are minimum shoreline vegetation cutting restrictions, lot width, structure setbacks, sewage disposal system setback and shoreline access requirements under the Adirondack Park Agency Act and regulations implementing the NYS Wild, Scenic and Recreational Rivers System Act. These shoreline protection standards are measured from the mean high water mark (MHWM - the average of the annual high water levels). Please contact Agency staff for requirements. If the project site has shoreline and you propose construction of any kind within 100 feet of the shoreline (150 feet for Recreational Rivers, 250 feet for Scenic Rivers), the MHWM will have to be established and shown on a site plan map in order to have a complete application. At the project sponsor's request, Agency staff will determine the MHWM at the project site or you can have the determination made by a NYS licensed land surveyor. If you are unsure of navigability, please contact Agency staff.

a) Does the project site contain any navigable water?
__X__ No (If no, go to Section 43 – Wetlands)
_____ Yes. Name of water body:_____
Length of shoreline on the project site (as it winds and turns): _____feet

b) Is any portion of the shoreline currently being used or proposed for use by others for deeded or contractual access to the water body?
__X__ No
_____ Yes. If yes, identify and describe all shoreline access parcels, the number of lots having access to each parcel and the dates access was granted. Also provide a complete copy of all deeds for all properties which have been granted access to the water body via a shoreline access parcel:

c) Will any vegetation be cut or removed within 35 feet of a lake or pond or navigable river or stream or within 100 feet of a designated NYS Wild, Scenic or Recreational River? (If you are uncertain whether the shoreline is along a designated river, check on the Adirondack Park Land Use and Development Plan Map, or the APA Regulations Appendix Q-6, or contact Agency staff.)
__X__ No
_____ Yes. If yes, describe type, amount and location of vegetation to be removed:

43. Wetlands:

Are there any wetlands on the project site?

_X_ No (If no, go to Section 44 – Visual Impacts)

_____ Yes. If yes, answer the following questions. The wetland boundaries as delineated and/or confirmed by Agency staff must be shown and labeled on the Site Plan Map.

a) Are any of the activities listed below proposed to occur within the boundaries of a freshwater wetland?

_____ No

_____ Yes. If yes, check all that apply:

____ Draining; dredging; excavation; removing soil, peat, muck, sand, shells or gravel

____ Dumping or filling with soil, stone, sand, gravel, mud, or fill of any kind

____ Erecting structures, building roads or driveways, driving pilings, or placing any other obstructions

____ Clearcutting of more than three acres: state number of acres_____

____ Applying pesticides or fertilizers

____ Constructing a wastewater treatment system or discharging a sewer outfall

If yes, please also provide a detailed written description of the measures taken to avoid or minimize wetland impacts:

b) Will the project result in the temporary or permanent loss of any wetland acreage by filling or draining?

_____ No

_____ Yes. If yes, amount of acreage to be lost: _____ square feet.

c) Will any of the activities listed below occur within the 100 feet of a wetland?

_____ No

_____Yes. If yes, check all that apply:

____ Constructing a wastewater treatment leaching or absorption facility

____ Applying pesticides

____ Conducting other activities that could impair the functions or benefits derived from wetlands, including any diversion of water or change in hydrology, or substantially increases erosion or sedimentation.

If "Yes" was checked for any of the questions in this section, a compensatory wetland mitigation plan prepared in accordance with the "New York State Adirondack Park Agency Compensatory Mitigation Guidelines" may be required. A copy of these guidelines is available on the Agency's website (www.apa.ny.gov) or upon request.

44. Visual Impacts:

Will the project involve a building, tower or other structure greater than 40 feet in height?

__X__ No (If no, go to Section 45 – Erosion and Sediment Control Plan)

_____ Yes. If yes, will the building, tower or other structure be visible from public roads, or publicly accessible open space or recreational facilities (e.g., hiking trails, parks, canoe routes)?

_____No

_____ Yes. If yes, Agency staff may direct that you prepare a "Visual Resource Assessment" report that identifies:

a) key viewpoints from publicly accessible areas;
b) key viewer groups; and
c) the type, distance and duration of the view.

You will also be asked to describe efforts to mitigate adverse visual impacts and may be required to prepare visual simulations showing how the proposed building or structure will appear after construction from selected viewpoints.

45. Erosion and Sediment Control Plan:

Will the project involve clearing, grading, grubbing or excavation?

_____ No

__X__ Yes. If yes, provide an Erosion and Sediment Control Plan. The plan shall apply to all on-site and off-site construction work areas, staging areas, on-site or off-site detours, borrow areas, and wetland mitigation sites. See Supplement 1.

a) Provide and label all temporary and permanent erosion and sediment control practices, including but not limited to silt fence, turbidity curtains, diversion structures, seeding, soil stabilization fabrics, and stone fill. Label the plan to show the type, size, and length of these measures.

b) Provide and label typical details, special notes and specifications for all stormwater management and erosion and sediment control facilities and practices. Describe installation and maintenance requirements. Typical details shall show the type, size, materials, and installation methods.

c) Identify temporary practices that will be converted to permanent facilities.

d) Provide an implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and the duration each practice is to remain in place.

46. Stormwater Management Plans:

Will the project involve a cumulative disturbance of one or more acres of land area by clearing, grading, grubbing or excavation or does the project involve a stormwater discharge to Waters of the United States?

__X__ No

_____ Yes. If yes, you may be required to obtain coverage under the NYSDEC Stormwater General Permit. Provide a copy of your Stormwater Management Plan required pursuant to the general permit.

47. Construction Staging Areas:

a) Describe (and show on the Site Plan Map) the location and proposed use of all on-site and off-site construction staging areas (e.g., for field office, equipment and materials storage, batch plants) for the project:

NA

b) Describe how the staging areas will be restored after construction completion:

NA

If the staging areas will be out of the right-of-way, provide the following information for each involved parcel:

Landowner Name: _____
Mailing Address: _____
Staging Area Site Location:
Street Address: _____ Town: _____ County: _____
Tax Map No: _____
Telephone Number (daytime): _____

48. Solid Waste Disposal:

Describe the type, estimated quantities, methods of disposal and on-site and off-site disposal locations of all waste materials generated from the project.

Type of Waste Material	Estimated Quantity	Disposal Method	Disposal Location
Trees, stumps and other grubbed materials	limited	left in place to nurture soil	
Unsuitable and excavated existing soils	none		
Construction and demolition debris	none		
Asbestos, paint chips and other hazardous substances	none		

If waste disposal will occur off-site, provide the following information for each involved parcel. Please note that a separate permit may be required for each off-site waste area. NA

Landowner Name: _____
Mailing Address: _____
Waste Disposal Site Location:
Street Address: _____ Town: _____ County: _____
Tax Map No: _____
Telephone Number (daytime): _____

49. Other Regulatory Permits and Approvals:

The Agency cannot approve a project which has been denied a permit or which is a prohibited use under local zoning requirements and other local laws or ordinances. The Agency will also recognize community goals expressed in a formally adopted land use plan. The project should be designed to the regulatory requirements of other involved agencies.

a) Local Government Notice Form: See Supplement 1.
Provide, as **Attachment G**, a completed copy of the Local Government Notice Form from the municipality in which your project is located. Have it filled out and signed by an appropriate official (e.g., Zoning Administrator, Planning Board Chairman or Supervisor, if no Zoning Administrator or Planning Board Chairman) and return it with the project application. Please read the form for instructions.

b) Municipal Approval Documents:
If local approval has been obtained for the proposed project, then provide as **Attachment H**, documentation (e.g., permit, site plan approval or final subdivision plat) to the Agency which confirms that the project has been approved pursuant to all applicable town and county laws including any necessary approvals from the planning and zoning boards. Also, please provide a copy of the relevant minutes of all local meetings at which the project has been discussed. (This last request is continuous; the information should be provided to the Agency as it becomes available.)

c) State and Federal Agency Contacts:
Complete the following and indicate whether any of the following agencies or departments have been contacted. Your APA application may remain incomplete until all state agency applications are complete, to allow a coordinated review.

Agency	No	Yes	Date	Contact Person & Phone Number
NYS Department of Health				
NYS Department of Transportation				
NYS Department of Environmental Conservation				
NYS Office of Parks, Recreation & Historic Preservation				
NYS Department of Law				
U.S. Army Corps of Engineers				
Lake George Park Commission				
Other				

d) State and Federal Permits, Approvals and Determinations:
Provide, as **Attachment I**, copies of all permits, approvals and determinations received from the above agencies.

50. Required Signatures:

I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED IN THIS APPLICATION, INCLUDING ALL ATTACHMENTS. I BELIEVE THIS INFORMATION TO BE TRUE, ACCURATE AND COMPLETE. IN ADDITION, IN THE CASE OF ANY PROJECT SPONSOR CORPORATION, LIMITED LIABILITY CORPORATION, PARTNERSHIP OR OTHER LEGAL ENTITY, I ALSO AFFIRM THAT I AM AUTHORIZED TO SUBMIT THIS APPLICATION ON BEHALF OF THAT ENTITY.

I HEREBY AUTHORIZE THE ADIRONDACK PARK AGENCY AND MEMBERS OF ITS STAFF TO ENTER ON THE PROPERTY DESCRIBED HEREIN FOR THE PURPOSES OF CONDUCTING SUCH INVESTIGATIONS, EXAMINATIONS, TESTS AND SITE EVALUATIONS AS IT DEEMS NECESSARY, AT REASONABLE TIMES AND WITH ADVANCE NOTICE WHERE POSSIBLE, TO VERIFY INFORMATION CONTAINED IN OR RELATED TO THIS APPLICATION FOR A PROJECT PERMIT.

Signature of all Project Sponsors: (if not the landowners)
(Required for all applications)

		15 NOV 2021
Mschool Manager		
Signature	**Print Name/Title**	**Date**

Signature(s) of all Landowner(s) from current deed:
(Required for all applications)

James P Pulsifer	JAMES P PULSIFER	11/17/2021
Signature	**Print Name**	**Date**

Signature of Authorized Representative:
(Required if designated in Section 3 of this application)

Signature	**Print Name**	**Date**

Attachment B

Provide names, mailing addresses, and tax map references (tax map, block and parcels numbers) for all landowners with property adjoining the project site, including property across public roads and rights-of-way.

Example: 155-1-27 Mr. John Doe Main Street Jay, New York 12941		

Attachment B

Provide names, mailing addresses, and tax map references (tax map, block and parcels numbers) for all landowners with property adjoining the project site, including property across public roads and rights-of-way.

Example: 155-1-27 Mr. John Doe Main Street Jay, New York 12941	38.3-1-1.100 Colby James Pulsifer PO Box 27 Lewis, NY 12950	
28.-2-1.000 BTG Pactual OEF Property 2 LP 1180 Peachtree St. NE Atlanta, GA 30309		
38.1-1-1.000 BTG Pactual OEF Property 2 LP 1180 Peachtree St. NE Atlanta, GA 30309		
38.1-1-3.000 120001 Finance Office, Fixed Cost Unit 110 State St. Albany, NY 12236		
38.3-1-1.200 William Pulsifer 8981 US Rte. 9 Lewis, NY 12950		
38.1-1-4.100 Diversified Upstate Enterprise 17 Racetrack Rd, NW Ste. E Fort Walton Beach, FL 32547		
38.3-1-41.000 NYCO Minerals 803 Mountain View Dr. Willsboro, NY 12996		
37.1-2-31.000 Philip Pulsifer PO Box 97 Lewis, NY 12950		

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LOCAL GOVERNMENT NOTICE FORM
for Project/Variance Application to the Adirondack Park Agency

The Adirondack Park Agency will not deem an application complete until the appropriate municipal official in the Town/Village where a project is located has completed, signed and returned this form to the Agency.

If the Town/Village where the project site is located has zoning or other regulations which apply to the proposal, the Adirondack Park Agency will be unable to issue a permit if: (a) the Town/Village has either refused to grant a necessary permit or variance, or (b) the proposal is a prohibited use in that jurisdiction.

To be completed by the Applicant: APA Project Number (if available): _____

Applicant Name: Michael Hopmeier Landowner Name: James Pulsifer

Project site location: Town/Village: Lewis, NY Tax Map Number: 38.1-1-31.000

Project type/description: construction of a ballistics test range

If the project involves a subdivision, please provide the appropriate local official a copy of the proposed plat as part of the project description with the plan title and date recorded in the space provided above.

To be completed by the Town/Village:

Does the Town/Village have land use controls? ..... ☐Yes ☐No

If Yes, please complete 1-9 below. If No, please skip to #9 below.

1) If the Town/Village has zoning, provide Zoning District Name(s): _____

2) How is the "use" defined under the local code? _____

Is the "use" allowed in the zoning district(s)? ..... ☐Yes ☐No

3) Is the project prohibited by any local law or ordinance? ..... ☐Yes ☐No

4) Does this project require a municipal permit? ..... ☐Yes ☐No

a) If Yes, is the required permit a building permit only? ..... ☐Yes ☐No

b) If No, identify the type of permit required: _____

5) Does this project require a municipal variance? ..... ☐Yes ☐No

If Yes, identify the type of variance required (e.g., area, setback, etc.) _____

6) Does the project require any other municipal approval? ..... ☐Yes ☐No

If Yes, identify the approval required: _____

7) Has the municipality received an application for this project? ..... ☐Yes ☐No

If Yes, has the municipality issued any decision on this project? ..... ☐Yes ☐No

8) Provide explanation for any decisions on this project or inconsistencies the project may have with local laws or any comments you wish to provide to the Agency about the project: _____

_____

9) Please provide a daytime contact telephone number with the best days/times to be reached, and/or an email address for the official signing this form, should Agency staff have further questions regarding municipal review of this project: (____)_____ best times_____

e-mail:_____

_____

Signature of Zoning Official or Planning Board Chair (or Supervisor/Mayor if no such official exists)

_____ _____

Name and Title (Print) ***Date***

Please return this completed & signed form to the address or fax number below.

P.O. Box 99 • 1133 NYS Route 86 • Ray Brook, NY 12977 • Tel: 518 891-4050 • Fax: 518 891-3938 • www.apa.ny.gov

Supplement 1

Adirondack Park Agency, Division of Regulatory Programs

Supplement to the Application for Commercial and/or Industrial Uses

submitted by

Unconventional Concepts, Inc.

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NOV 19 2021

Note: this document contains responses to the APA Application for Commercial and/or Industrial Uses submitted by Unconventional Concepts, Inc. The responses in this supplement are too long to be written into the hard copy of the application. For clarity, responses include the question number from the application, and the text of the question. Questions are in black, UCI's responses are in blue.

8. **Project Proposal:**
   a. Provide a detailed written description of the intended commercial/industrial activities/services to be provided

SUMMARY We wish to create a shooting range approximately 330 yds long for use in supporting research and development operations. The range will have very limited access, be used sporadically throughout the year, and will only be used during daylight hours. Any structures and infrastructure will be strictly temporary and mobile in nature; they will be deployed during test operations and removed as soon as possible after a test series is completed. Infrastructure will include a mobile power supply such as a generator on a trailer, portable instrumentation carriers, a trailer, a porta potty, and other mobile support equipment. In between test series, all trailers and equipment will be removed from the site at 195 Hale Hill Lane and stored at the 87 Hale Hill Lane address (ADK facility, Unconventional Concepts, Inc., i.e., "the missile silo site").

The site at 195 Hale Hill Lane has been chosen because it provides easy access to mountains, which will act as a projectile backstop. The mountains in question will also assist with noise abatement by reflecting sound west of the site into uninhabited areas and minimizing noise impact on the local population. In addition, the site is isolated and access is controlled, which enhances safety and security.

Modification to the existing terrain will be minimal. The site chosen is an existing natural clearing directly adjacent to an already existing fire and access road. Land modification is anticipated to be limited to smoothing and laying gravel in the existing natural clearing, and clearing brush and a limited number of trees between the firing pad and the mountain. There are no bodies of water, streams or river, or other wetlands in proximity to the site. All gravel will be provided from a quarry less than 1 mile away, thereby ensuring no foreign material, flora, or fauna will be introduced.

The only significant addition to the site may be a portable steel cargo container (dimensions: 8 ft × 8 ft × 40 ft), which would be filled with sand or other aggregate and used as a projectile-catcher. However, the current intent is that test shots will impact the mountain at the end of the range. Thus, the steel cargo container is not expected to be necessary.

BACKGROUND This firing range will be developed and used to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance.

This effort will focus on the test and evaluation of these new systems in support of a critical US Army research program managed from Benét Laboratories at Watervliet Arsenal in Albany, NY. The project will focus on the instrumentation and firing of these systems in a constrained area to allow for measurement and assessment of the internal ballistics and kinetic and kinematic effects of these new designs. It will consist of a leveled pad at the end of a clearing, in a small valley near a two-mountain range. In that location, test shots can be fired safely with the mountain as a backstop, and the noise will be abated by the geography.

In effect, we are building a shooting range and will fire non-toxic, inert, steel projectiles over a distance of approximately 300 yards.

This will require the manufacture of a small (approximately 100 ft × 100 ft) hard stand, made from a combination of large and small crushed stone aggregate (obtained from the Oak Hill Mine site less than 1 mile away; the mine was formerly owned by NYCO, but is currently operated by IMERYS), which will be laid and compacted into a level firing platform. The identified site is adjacent to existing heavy transport logging roads, so no new infrastructure will be required. The firing pad will allow for the seepage of rain water and run-off into existing water paths. There are no wetlands or any other areas of interest in near proximity to the firing site.

All test equipment and instrumentation will be portable; equipment will be deployed as needed to the site for a test and will then be completely removed at the end of the test. No more than three tests per month are anticipated. Each test will consist of 1-3 shots, and each series of shots will last no more than 2 days. Local property owners who may be impacted (by noise) will be notified a minimum of one week in advance of the anticipated test. Testing will only occur on weekdays, between the hours of 10:00 AM and 4:00 PM local time. Approximately ten personnel will be required on site for each test; vehicle traffic for personnel and equipment transport will be limited to the existing transport areas and logging roads already in place.

To minimize the impact on the local community and area, we plan to notify all interested parties (a list will be provided by the local town supervisor, consistent with the list used by the local mining operation), and each party will be notified a minimum of one week in advance prior to any firing. In addition, 24 hours prior to any firing, local law enforcement and 911 will also be notified in the event that anyone from the local community expresses concern. Further, we will invite local officials, to include elected representatives and law enforcement, to attend and observe operations as they occur. However, operations will not be open to the public; observation will be limited due to safety and security concerns.

At the completion of each test series, all equipment, residue, and debris will be cleaned up and transported or managed on site appropriately. Debris will principally consist of the steel projectiles and any rubble created from impact with the ground.

These tests are anticipated to continue for a period of 5 years, with an average of no more than 30 shots per year.

Three primary considerations of the effort are to minimize the impact on the surrounding environment and community, to make use to the greatest extent possible of materials and supplies sourced from the immediate area (i.e., packed aggregate rather than concrete or black-top), and to expand the technical and employment base of the local community.

This work was first considered for a nearby location (Atlas F missile silo, 87 Hale Hill Lane, Lewis, NY); the work could be performed at the silo site with no modification to that site. However, the site at 195 Hale Hill Lane is being explored as a means of enhancing noise abatement and further minimizing the impact on the surrounding environment. The 195 Hale Hill Lane location is less than 1 mile from the missile silo site, but is on the opposite side of a small grouping of mountains, thereby allowing for the reflection/deflection of noise away from more populated areas and into a large open space that can absorb and dampen any impact.

The firing range is an extension of the effort currently ongoing at 87 Hale Hill Lane, a former thermonuclear missile launch facility. Upon purchase of the missile silo in 2015, UCI proceeded to spend nearly $500,000.00 within the first 18 months of ownership on the cleanup and improvement of the site. This cleanup was closely coordinated with the New York Department of Environmental Conservation (DEC), Army Corps of Engineers, and local community. It included removal and proper disposal of nearly 200 tons of garbage and debris that had accumulated over the previous 50 years due to the local community using the location as a dump; the collection, storage, and processing of nearly 100,000 gallons of water prior to release into the local environment; and the removal and proper disposal of approximately 120 tons of lightly contaminated soil. This work was permitted and coordinated with the DEC, US Environmental Protection Agency (EPA), and local authorities. To the best of our knowledge, we are the only silo owner in the New York/Vermont area that has expended the effort to properly clean up and improve a local site.

We take environmental impact very seriously, and we do our best to minimize the impact of our activities whenever possible. That can be demonstrated by the extreme length and expense we have invested to preserve and reclaim the environment and minimize our impact and footprint on the local community. Our goal has been, and continues to be, the maintenance to the greatest extent possible of the pristine and natural environment in which we live, while still performing our operations.

b. Provide a detailed written description of the major site development elements of the project (e.g.: new building, parking for 32 cars, etc.).

The site for the firing range was chosen explicitly to minimize the impact on both the local terrain and the surrounding area. It consists of an existing natural clearing directly adjacent to an existing fire and access road. The selected location is in direct line of sight to a mountain backstop approximately 330 yds away, with only light brush and small trees in the intervening space. All equipment and infrastructure deployed to the test range will be temporary and mobile, including methods of power generation, instrumentation, protection of test equipment, and other support resources such as a porta potty. All of these items will be trailer-mounted and/or mobile and portable; items will be deployed

for each test series, and then removed at the completion of each experiment. The only modification to the terrain will be the smoothing and leveling of the existing natural clearing and installation of an aggregate compacted gravel surface to reduce erosion and degradation of the terrain. The gravel and aggregate will be sourced from a local quarry, thereby ensuring no introduction of foreign materials, flora, or fauna to the test site.

c. **Provide a detailed written description of the need for** the selected project design and describe what, **if any, alternative were** considered and the reasons for rejection of each **alternative:**

The site at 195 Hale Hill Lane was chosen as an alternative to an existing approved commercial site (existing Atlas F missile silo, 87 Hale Hill Lane, Lewis, NY) approximately 1 mile east. The selected site was determined to be more appropriate, as it will result in less impact on the surrounding community and environment, primarily due to increased natural noise abatement. In addition, the site at 195 Hale Hill Lane is more remote, thereby further limiting access, and would require less modification than the missile silo site, thereby reducing environmental impact.

Several other locations near the missile silo site were considered, but were rejected primarily due to less than optimal local geography, or requirements for further disruption of the local environment to make them more suitable. A site in close proximity to the missile silo site is required, because preparation, support, and data collection will occur at the missile silo site.

Beyond these obvious considerations, the issue of visual impact on the surrounding environment was also considered. The site at 195 Hale Hill Lane will minimize that impact and will also provide greater isolation, thereby reducing the visual signature of the test site during the vast majority of time. The only visual impact will occur during those limited periods when portable and mobile equipment is emplaced for testing.

14. Project Employment and other Benefits:

a. **Commercial, industrial, residential, recreational as well as other benefits may be derived by a project. For example, a new commercial/industrial use might provide benefits to the community by filling a need for specific goods or services not currently available,** providing goods or services that support existing commercial/industrial **uses, or** generating economic growth by promoting the need for additional new **commercial/industrial uses. Please describe any potential benefits to be derived from the project including general service improvements to the community:**

The creation of this test range will allow for the expansion of research and development at the 87 Hale Hill Lane site. This expansion will allow for the hiring of more personnel with advanced technical and research backgrounds who will then be able to contribute not only to national security, but also to the local and regional economy. These potential advantages have been discussed at length with local elected leaders, who have expressed great interest in the potential for expanding the local population base with a broader demographic of scientific and technically trained and interested community members and their families. This expansion is part of an ongoing strategic plan at UCI's ADK facility to build and expand the local community to support a wide array of research and development programs including environmental research, telecommunications, and national security. This effort is consistent with UCI's policy over the last five years of

building and supporting the local community and its infrastructure beyond the narrowly focused capabilities required to support our programs.

17. Site Plan Map:

A detailed, to-scale Site Plan Map is required for each commercial/industrial use application. The Site Plan Map may be combined with the survey or deed plot required by Section 38, as ATTACHMENT D. Site Plan Maps should be prepared by an appropriately qualified person to so act in the State (i.e., licensed surveyor, engineer, architect, or landscape architect). The Site Plan Map is the best way to show what you propose to do on the project site.

Provide a Site Plan Map drawn to scale of one inch equals 20 or 40 feet, which is clearly labeled with the map scale, north arrow, date of preparation, and name of preparer. Show and label all of the following within the proposed project limits for each area of proposed construction:

b. Proposed Conditions, including all:

vi. construction limit lines;

Construction limit lines are provided in Attachment L, Sketch Plan; note that the area denoted in red is a natural clearing, and construction will only be limited to putting down aggregate to control erosion.

xv. limits of vegetative cutting; and

Limits of vegetative cutting are provided in Attachment L, Sketch Plan; cutting will be limited to what is necessary to maintain clear line of sight in an already existing firing line.

19. Proposed Site Access:

b. Describe the location, type of material, and size of any proposed permanent roads and driveways within the project site:

The site selected for construction of the test range is in a natural clearing and is directly adjacent to an existing fire/access road. Thus, no new permanent roads or driveways will be required. The existing clearing will be smoothed and leveled, then covered with aggregate to reduce erosion and ensure the site experiences little to no impact from water runoff as a result of unusually heavy rains, should they occur.

34. Operating Profile: Machinery

a. **Provide a list of all major installed and mobile equipment and the noise decibel levels of** each.

No installed (permanently emplaced) equipment will be used. All equipment will be portable (designed to be removed) or mobile (already on wheeled transport such as trailers or powered vehicles). Principal equipment will include the gun systems, instrumentation trailers, field repair and maintenance systems, and a mobile power supply such as a trailer- or vehicle-mounted generator. Continuous noise, primarily from the generator, is not expected to exceed 65 dB. Impulse noise with durations of less than one half of one second is not expected to exceed 180 dB.

b. Identify on the Site Plan Map the expected operating location(s) of any outside mobile equipment and any installed equipment with through-the-wall openings to the outside (e.g., debarkers or chippers).
    i. Information is provided in Attachment L, Sketch Map
        1. The red square in Attachment L denotes the expected operating location of all outside mobile equipment
        2. No equipment will be permanently installed on site

35. Operating Profile: Periods of Operation

a. Indicate the expected hours of operation and number of days per week that the facility is expected to operate.
    i. Operation will be periodic and sporadic, with a minimum of one week notice prior to testing to the local populace. This will be in accordance with approved operating procedures.

b. How many work shifts are anticipated? Indicate the expected starting hour for each.
    i. During testing a single shift is anticipated; operating hours will be weekdays only, 10:00 AM to 4:00 PM local time. No more than three tests per month are anticipated. Each test will consist of 1-3 shots, and each series of shots will last no more than 2 days.

c. Are changes in numbers of shifts, overall operating hours, or number of operating days expected as the operation matures?
    i. No change

45. Erosion and Sediment Control Plan:

Will the project involve clearing, grading, grubbing or excavation? YES

_____ No

__x__ Yes. If yes, provide an Erosion and Sediment Control Plan. The plan shall apply to all on-site and off-site construction work areas, staging areas, on-site or off-site detours, borrow areas, and wetland mitigation sites.

a. Provide and label all temporary and permanent erosion and sediment control practices, including but not limited to silt fence, turbidity curtains, diversion structures, seeding, soil stabilization fabrics, and stone fill. Label the plan to show the type, size, and length of these measures.

    As noted earlier, only limited grading and clearing will be required, as the site was chosen in part due to the existing natural clearing and line of site access from the firing pad to the impact point. As a result, no erosion is anticipated and thus erosion control measures should not be required. No temporary erosion control is anticipated to be required, and no temporary practices will be converted to permanent processes.

b. Provide and label typical details, special notes and specifications for all stormwater management and erosion and sediment control facilities and practices. Describe installation and maintenance requirements. Typical details shall show the type, size, materials, and installation methods.

    NA

c. Identify temporary practices that will be converted to permanent facilities.

    NA

d. Provide an implementation schedule for staging temporary erosion and sediment control practices, including the timing of initial placement and the duration each practice is to remain in place.

NA

49. Other Regulatory Permits and Approvals:

The Agency cannot approve a project which has been denied a permit or which is a prohibited use under local zoning requirements and other local laws or ordinances. The Agency will also recognize community goals expressed in a formally adopted land use plan. The project should be designed to the regulatory requirements of other involved agencies.

Based on discussion with local officials (Lewis Town Supervisor and Lewis Town Code Enforcement Officer), no local approvals will be required. Points of contact for federal agency sponsors can be provided upon request.

a. Local Government Notice Form: Provide, as Attachment G, a completed copy of the Local Government Notice Form from the municipality in which your project is located. Have it filled out and signed by an appropriate official (e.g., Zoning Administrator, Planning Board Chairman or Supervisor, if no Zoning Administrator or Planning Board Chairman) and return it with the project application. Please read the form for instructions.

NA

b. Municipal Approval Documents: If local approval has been obtained for the proposed project, then provide as Attachment H, documentation (e.g., permit, site plan approval or final subdivision plat) to the Agency which confirms that the project has been approved pursuant to all applicable town and county laws including any necessary approvals from the planning and zoning boards. Also, please provide a copy of the relevant minutes of all local meetings at which the project has been discussed. (This last request is continuous; the information should be provided to the Agency as it becomes available.)

NA

c. State and Federal Agency Contacts: Complete the following and indicate whether any of the following agencies or departments have been contacted. Your APA application may remain incomplete until all state agency applications are complete, to allow a coordinated review.

NA

d. State and Federal Permits, Approvals and Determinations: Provide, as Attachment I, copies of all permits, approvals and determinations received from the above agencies.

NA

- Attachment A

Property Description Report For: 195 Hale Hill Ln, Municipality of Lewis

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Status:	Active		
Roll Section:	Taxable		
Swis:	153200		
Tax Map ID #:	38.1-1-31.000		
Property #:	6351104003		
Property Class:	260 - Seasonal res		
Site:	RES 1		
In Ag. District:	No		
Site Property Class:	260 - Seasonal res		
Zoning Code:	01		
Neighborhood Code:	00218 - Town Outside		
Total Acreage/Size:	197.00	**School District:**	Boquet Valley
Land Assessment:	2021 - $96,800	**Total Assessment:**	2021 - $125,500
Full Market Value:	2021 - $125,500		
Equalization Rate:	----	**Property Desc:**	48 Essex Tract Bldg 2 167AC Under 480A RPTL
Deed Book:	338	**Deed Page:**	210
Grid East:	697995	**Grid North:**	1577672

Area

Living Area:	1,084 sq. ft.	**First Story Area:**	1,084 sq. ft.
Second Story Area:	0 sq. ft.	**Half Story Area:**	0 sq. ft.
Additional Story Area:	0 sq. ft.	**3/4 Story Area:**	0 sq. ft.
Finished Basement:	0 sq. ft.	**Number of Stories:**	1
Finished Rec Room	0 sq. ft.	**Finished Area Over Garage**	0 sq. ft.

Structure

Building Style:	Cottage	**Bathrooms (Full - Half):**	0 - 0
Bedrooms:	3	**Kitchens:**	0
Fireplaces:	0	**Basement Type:**	Slab/pier
Porch Type:	Porch-coverd	**Porch Area:**	110.00
Basement Garage Cap:	0	**Attached Garage Cap:**	0.00 sq. ft.
Overall Condition:	Normal	**Overall Grade:**	Economy
Year Built:	1962		

Owners

Philip Pulsifer
P.O. Box 97
Lewis NY 12950

Sales

No Sales Information Available

Utilities

Sewer Type:	None	**Water Supply:**	None
Utilities:	No Public	**Heat Type:**	No central
Fuel Type:	None	**Central Air:**	No

Improvements

Structure	Size	Grade	Condition	Year
Porch-coverd	5 x 22	Economy	Fair	1962
Porch-coverd	3 x 7	Economy	Fair	1962
Shed-machine	10 x 24	Economy	Fair	1962
Shed-machine	14 x 20	Economy	Fair	1962

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Land Types

Type	Size
Woodland	167.00 acres
Undeveloped	1.00 acres
Woodland	29.00 acres

Special Districts for 2021

Description	Units	Percent	Type	Value
E1636-Emergency Services	0	0%		0
FD320-Fire District	0	0%		0

Exemptions

Year	Description	Amount	Exempt %	Start Yr	End Yr	V Flag	H Code	Own %
2021	PRIV FOR	$53,120	0	2020				0

Taxes

Year	Description	Amount
2021	County	$585.54
2020	County	$941.62
2020	School	$1,015.38

*** Taxes reflect exemptions, but may not include recent changes in assessment.**

37

FORM 355 N Y DEED—BARGAIN AND SALE (Laws of 1917, Chap. 691, Statutory Form 8)

TUTTLE LAW PRINT REGISTERED U.S. PAT. OFFICE Tuttle Law Print Publishers, Rutland, Vt.

BOOK 338 PAGE 210

This Indenture,

Made the 19th *day of* July, *Nineteen Hundred and* fifty-six,

Between Elton A. Foote, residing at Little Falls, New York,

party of the first part, and

Philip Pulsifer residing in the Town of Lewis, Essex County, New York,

party of the second part,

Witnesseth, *that the party of the first part, in consideration of*

One----------*Dollar*

($ 1.00) *lawful money of the United States,* and other good and valuable consideration *paid by the party of the second part, do* es *hereby grant and release unto the party of the second part,* his heirs *and assigns forever,"all* those two tracts or parcels of land, situate in the Town of Lewis, County of Essex and State of New York, and described as follows, known and designated as Lot No. 48, Essex Tract, Henry's Survey, containing 185 acres, also Lot 51, Essex Tract, Henry's Survey, containing 168 acres.

Being part of the premises conveyed by Jesse S. Lamoreaux and wife to Merritt C. Stanton and Elton A. Foote by deed dated May 12, 1913, recorded in Essex County Clerk's Office in Book 148 of Deeds, page 439 on May 23, 1913."

The above described premises being the same as were conveyed by Merritt C. Stanton to Elton A. Foote by deed dated January 13, 1941, and recorded in said Clerk's Office on June 27, 1947 in Book 251 of Deeds, at page 409.

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Book 338 Page 211

Together with the appurtenances and all the estate and rights of the part y of the first part in and to said premises,

To have and to hold the premises herein granted unto the part y of the second part, his heirs and assigns forever.

In Witness Whereof, the part y of the first part has hereunto set his hand and seal the day and year first above written.

In Presence of

Elton A Foote L S

L S

L S

L S



39

BOOK 338 PAGE 212

State of New York
County of Essex } SS.
of

On this 23rd day of July, Nineteen Hundred and fifty-six, before me, the subscriber, personally appeared

ELTON A. FOOTE,

to me personally known and known to me to be the same person described in and who executed the within Instrument, and he duly acknowledged to me that he executed the same

Marie Smith Nye

MARIE SMITH NYE
NOTARY PUBLIC, STATE OF NEW YORK
ESSEX COUNTY NO. 10-517-1[illegible]
TERM EXPIRES MARCH 30, 1958

Deed
BARGAIN AND SALE

ELTON A. FOOTE

TO

PHILIP PULSIFER

Dated. July 19 1956

STATE OF NEW YORK
County of Essex SS.

RECORDED ON THE
16 day of September A.D. 1956
at 10 o'clock M.
in LIBER 338 of DEEDS
at PAGE 210 and examined

[illegible] CLERK

Attachment D

Adirondack Park Agency, Division of Regulatory Programs

Application for Commercial and/or Industrial Uses

Submitted by Unconventional Concepts, Inc.

Concerning construction of a ballistics test range at 195 Hale Hill Lane, Lewis, NY

ATTACHMENT D

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Map of Property Lines, Parcel 38.1-1-31.000 (195 Hale Hill Lane, Lewis, NY)

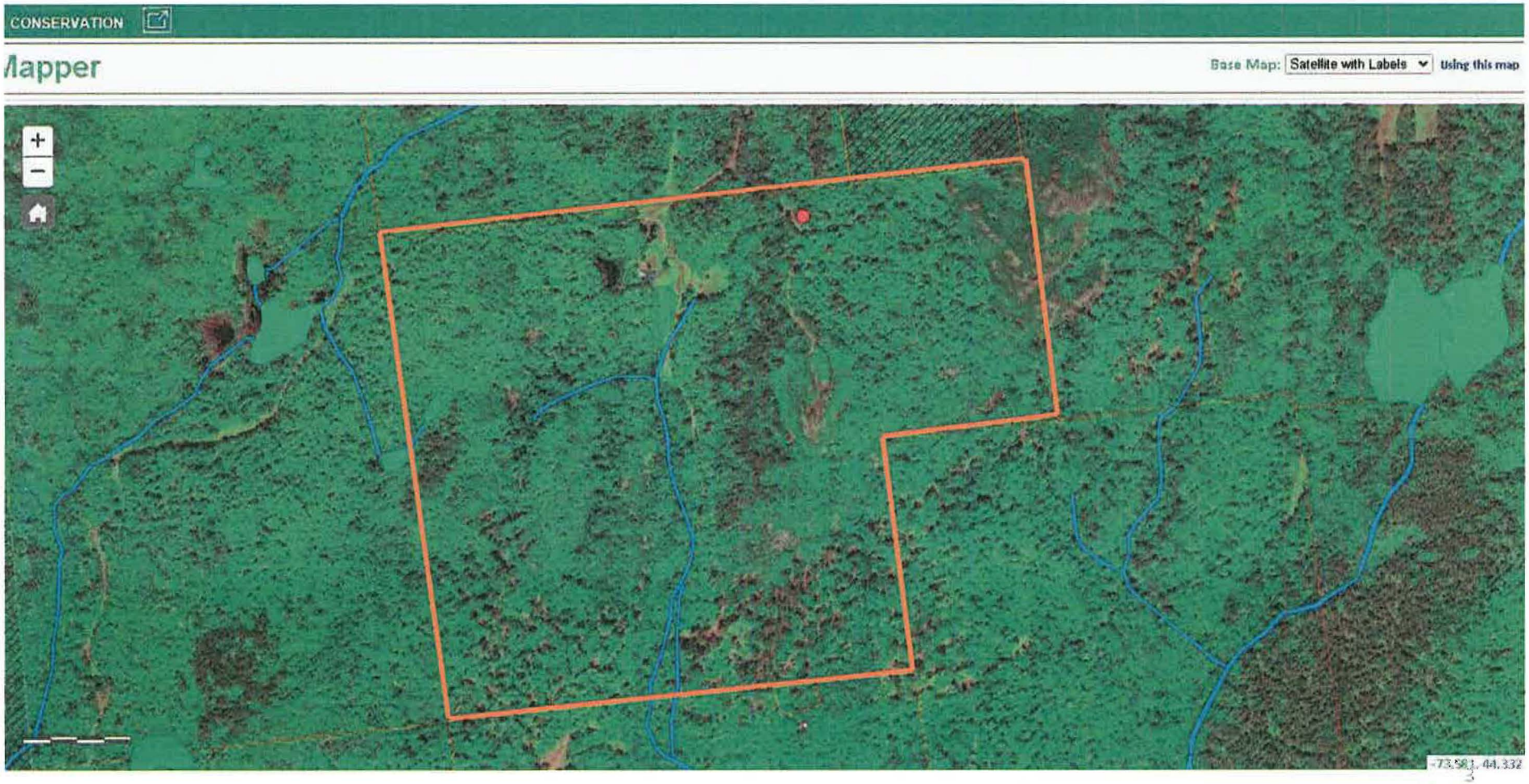


New York Farmland Values, Soil Survey & GIS Map | AcreValue; the hunting cabin is marked with a blue pin; the proposed firing range is marked with a blue square.

2

42

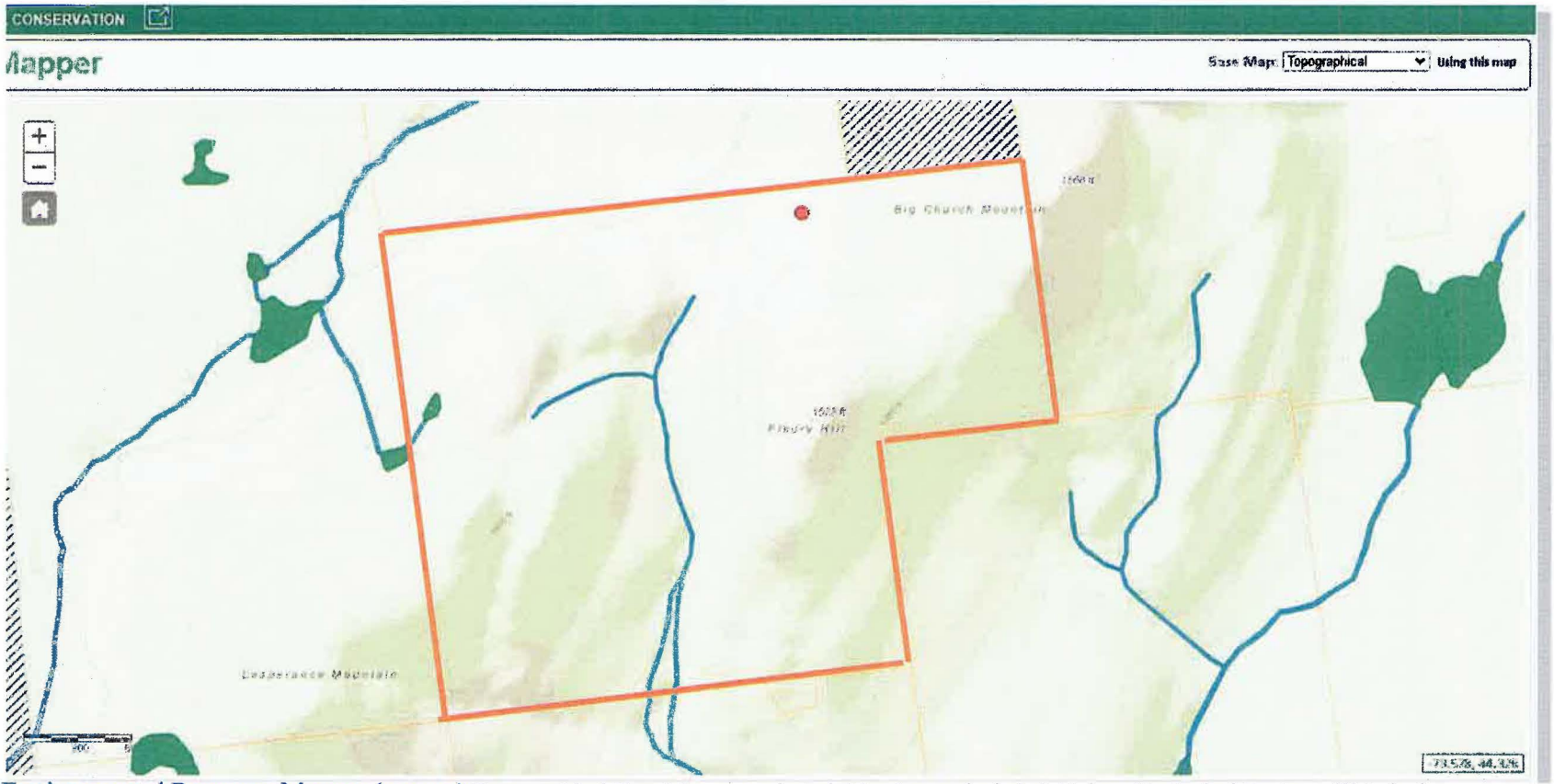
Water Bodies Including Ponds, Rivers and Permanent and Intermittent Streams, and Wetlands



Environmental Resource Mapper (ny.gov); National Wetlands Inventory map layer was applied; the proposed firing range is marked with a red circle

43

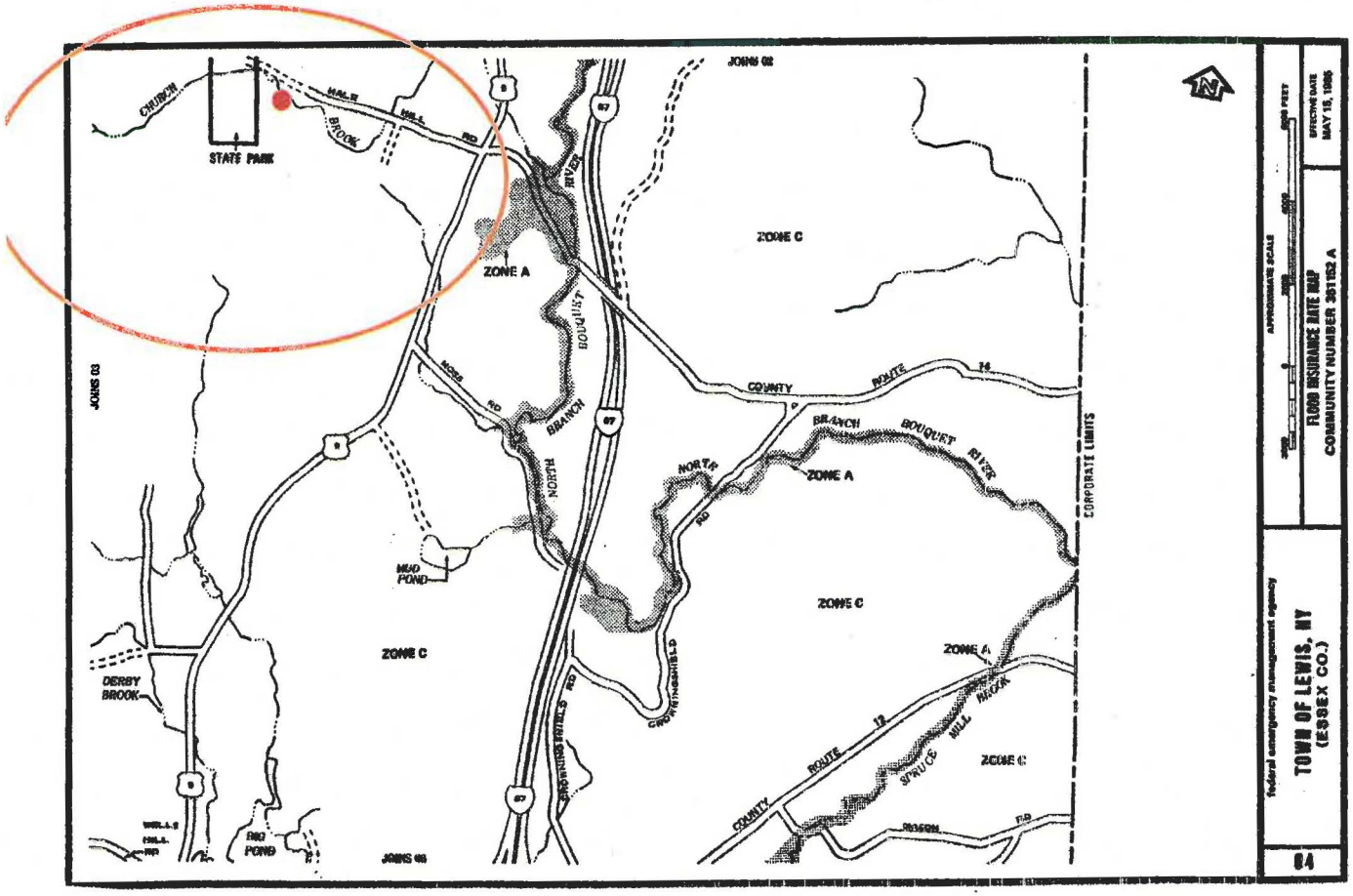
Topographical Map: Water Bodies Including Ponds, Rivers and Permanent and Intermittent Streams, and Wetlands



Environmental Resource Mapper (ny.gov) Topographical Base Map was selected. Map Layers included: Unique Geological Features, Waterbody Classifications for Rivers/Streams, Waterbody Classifications for Lakes, State Regulated Freshwater Wetlands, Imperiled Mussels, Mussel Screening Streams, Significant Natural Communities. Additional layers incuded: Eatuarine and Marine Deepwater, Estuarine and Marine Wetland, Freshwater Emergent Wetland, Forested/Shrub Wetland, Freshwater Pond, Lake, Riverline, Other; the proposed firing range is marked with a red circle

4

Floodplain Boundaries And Elevation of the 100-year Floodplain.
FEMA Flood Map Service Center Map



Areas of 100-year flood; base flood elevations and flood hazard factors were not determined by the FEMA Map Service Center.

FIRMette Web [361152A] (fema.gov)

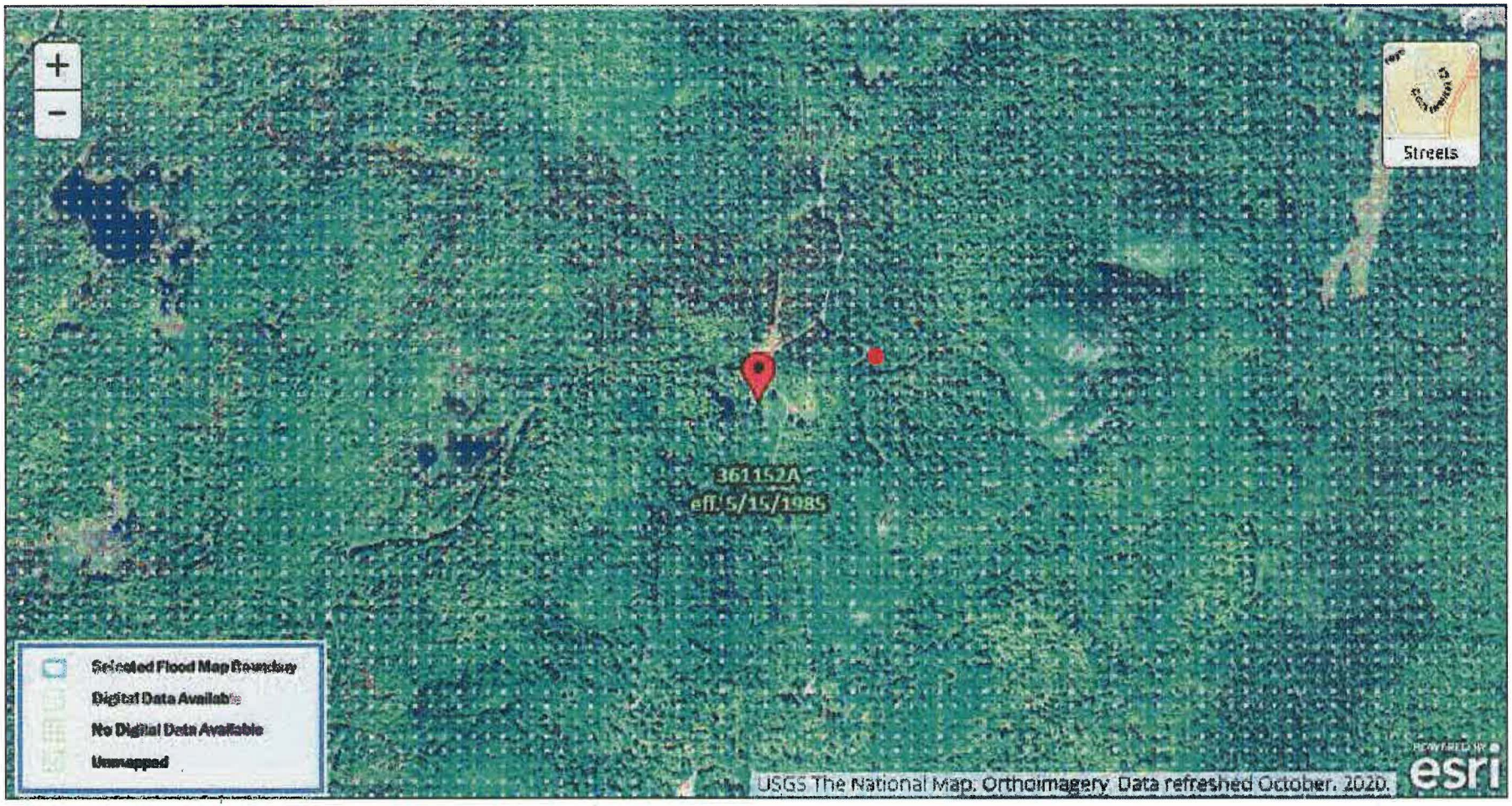
The flood map for the selected area is 361152A, effective as of 05/15/1985

The site of the proposed firing range is marked with a red dot.

5

45

Floodplain Boundaries and Elevation of the 100-year Floodplain Map, with Legend



FEMA Flood Map Service Center | Search By Address; the site of the proposed firing range is marked with a red circle 6

Areas of Bedrock at or Near the Surface



AVG NCCPI	COUNTY AVG	Source: NRCS Soil Survey
7.7	38.0	

All fields 196 ac

SOIL CODE	SOIL DESCRIPTION	ACRES	PERCENTAGE OF FIELD	SOIL CLASS	AVG NCCPI
LyF	Lyman-Knob Lock complex, 35 to 60 percent slopes, very rocky, very bouldery	76.97	39.2%	7	2.6
BkD	Becket-Tunbridge complex, 15 to 35 percent slopes, rocky, very bouldery	55.86	28.4%	6	4.8
BkC	Becket-Tunbridge complex, 3 to 15 percent slopes, rocky, very bouldery	43.99	22.4%	6	20.7
TuD	Tunbridge-Lyman complex, 15 to 35 percent slopes, very rocky, very bouldery	16.52	8.4%	6	3.7
SrB	Skerry fine sandy loam, 0 to 8 percent slopes, very bouldery	2.84	1.4%	6	24.3
RpF	Rock outcrop-Knob Lock-Lyman complex, 35 to 60 percent slopes, very bouldery	0.25	0.1%	7	1.3
		196.42			7.7

Map / About / FAQ / Ag-Analytics Technology Company

All Rights Reserved Terms of Service Privacy © 2021 Ag-Analytics

[New York Farmland Values, Soil Survey & GIS Map | AcreValue](#)
[NY State Mines and Wells](#); the site of the proposed firing range is marked with a red dot

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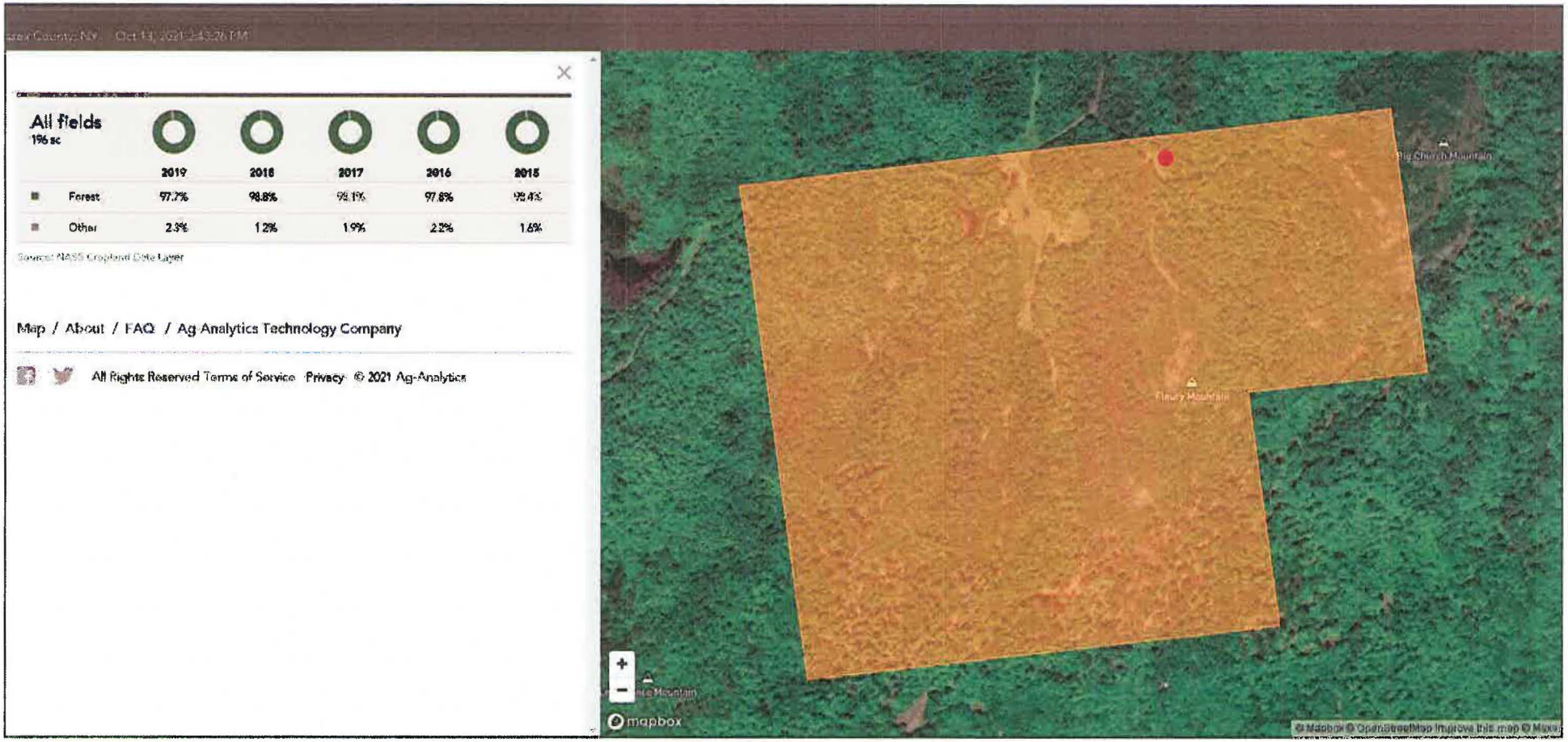
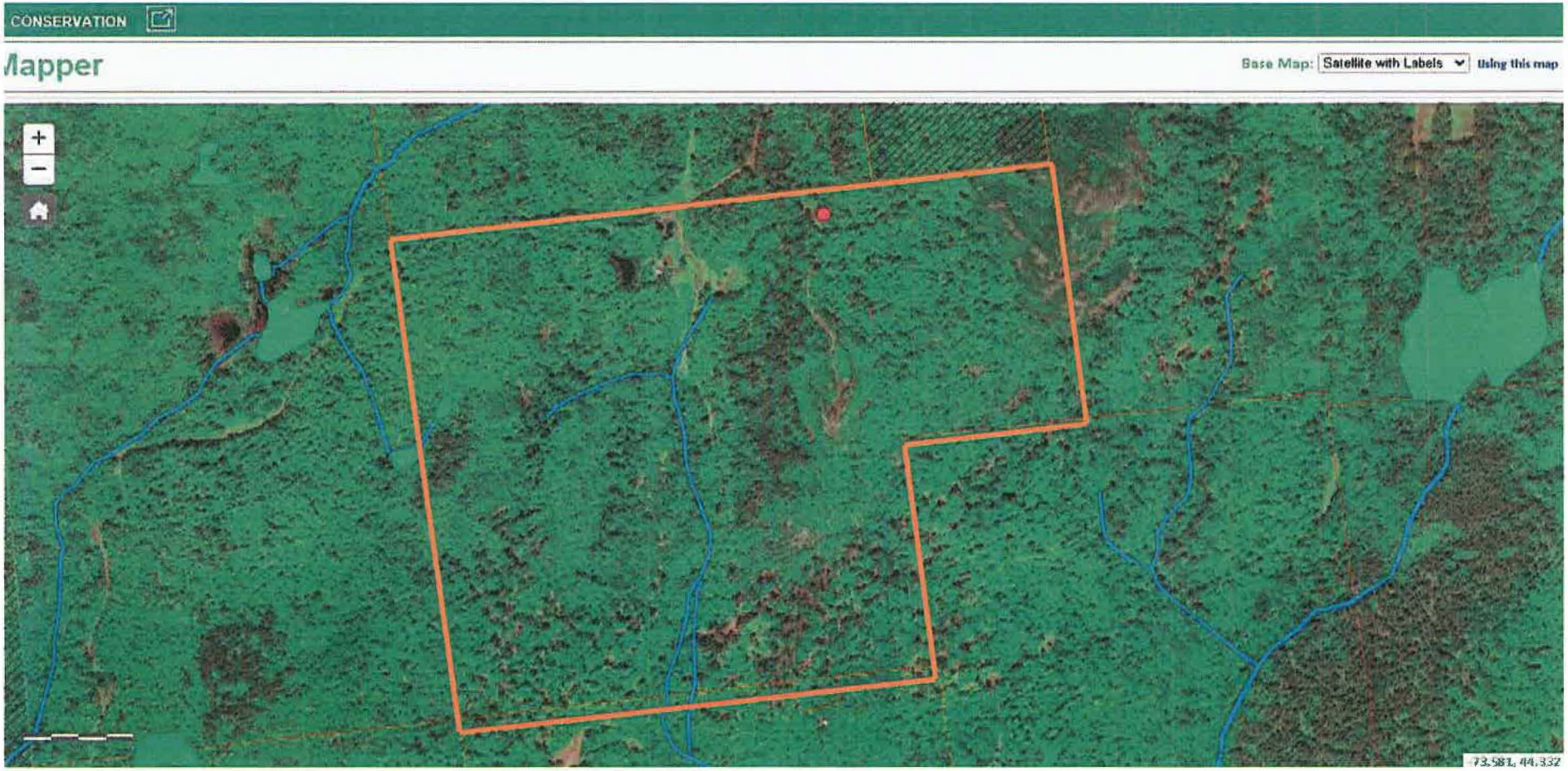
Boundaries of Existing Vegetation Cover Types (Forested, Field, Agricultural)



New York Farmland Values, Soil Survey & GIS Map | AcreValue; the proposed site of the firing range is marked with a red dot.

Special Plant or Animal Habitats, as noted on the NYSDEC Natural Heritage Database. New York Natural Heritage has no records to report in the vicinity.



Environmental Resource Mapper (ny.gov) Map Layers included: Significant Natural Communities, Natural Communities Near This Location, Rare Plants and Animals; the proposed site of the firing range is marked with a red dot. 9

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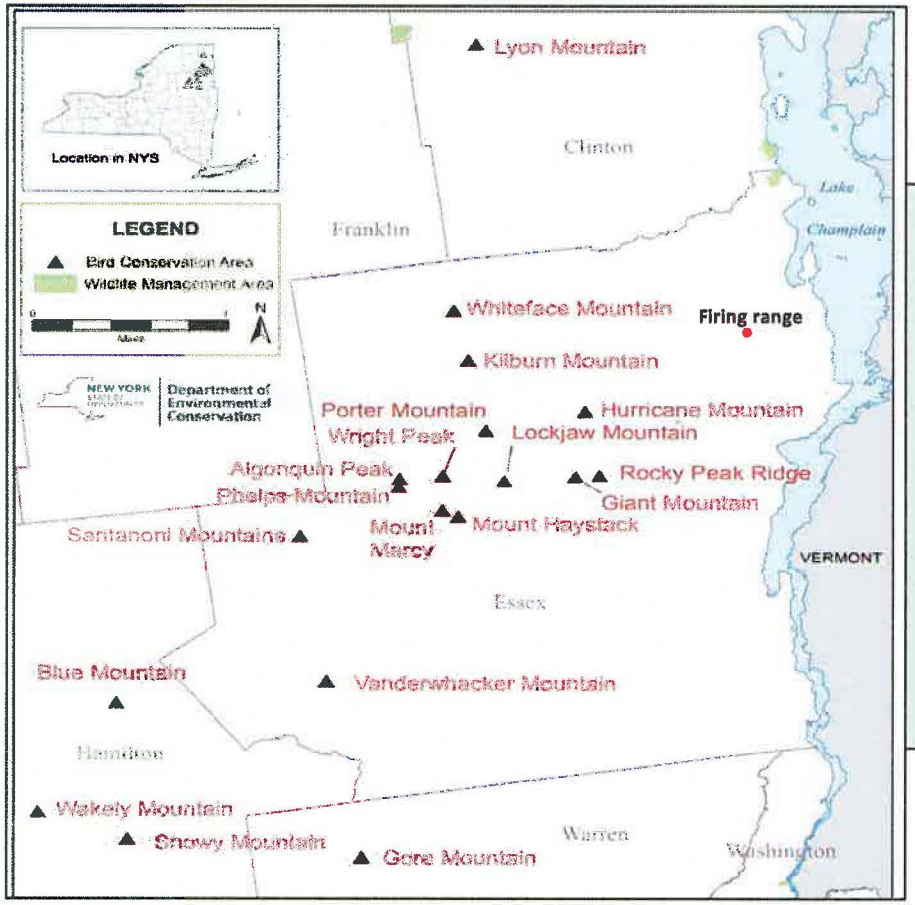
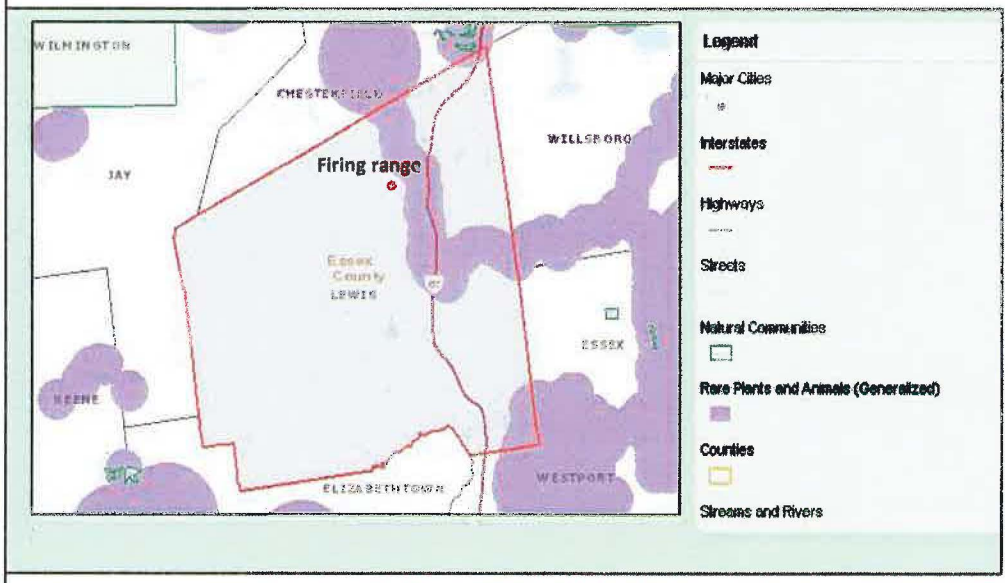
Adirondack Sub-Alpine Forest Bird Conservation Area
and records of rare species from database of the NY Natural Heritage Program



Little Church Mountain and Big Church Mountain are not listed as Bird Conservation Areas.

[Adirondack Sub-Alpine Forest Bird Conservation Area Map (ny.gov)]



[New York Nature Explorer (ny.gov)] Town: Lewis (Essex County) map of Nature Explorer (New York's Biodiversity.) Department of Environmental Conservation (DEC) provides no definitive statement about the presence or absence of all plants and animals, including rare or state-listed species.

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Intersecting Private Roadways and Driveways



There is one private roadway on the property; it intersects with the public roadway Hale Hill Lane.
DOT ID: 105467
Length: 0.45 miles
Pvt Type: U
Pvt Width: 20 ft
Shldr Width: 2 ft
Source: 2021 LHI Local Roads and Streets, Region 1.pdf (ny.gov), Page 189
06/22/21

11

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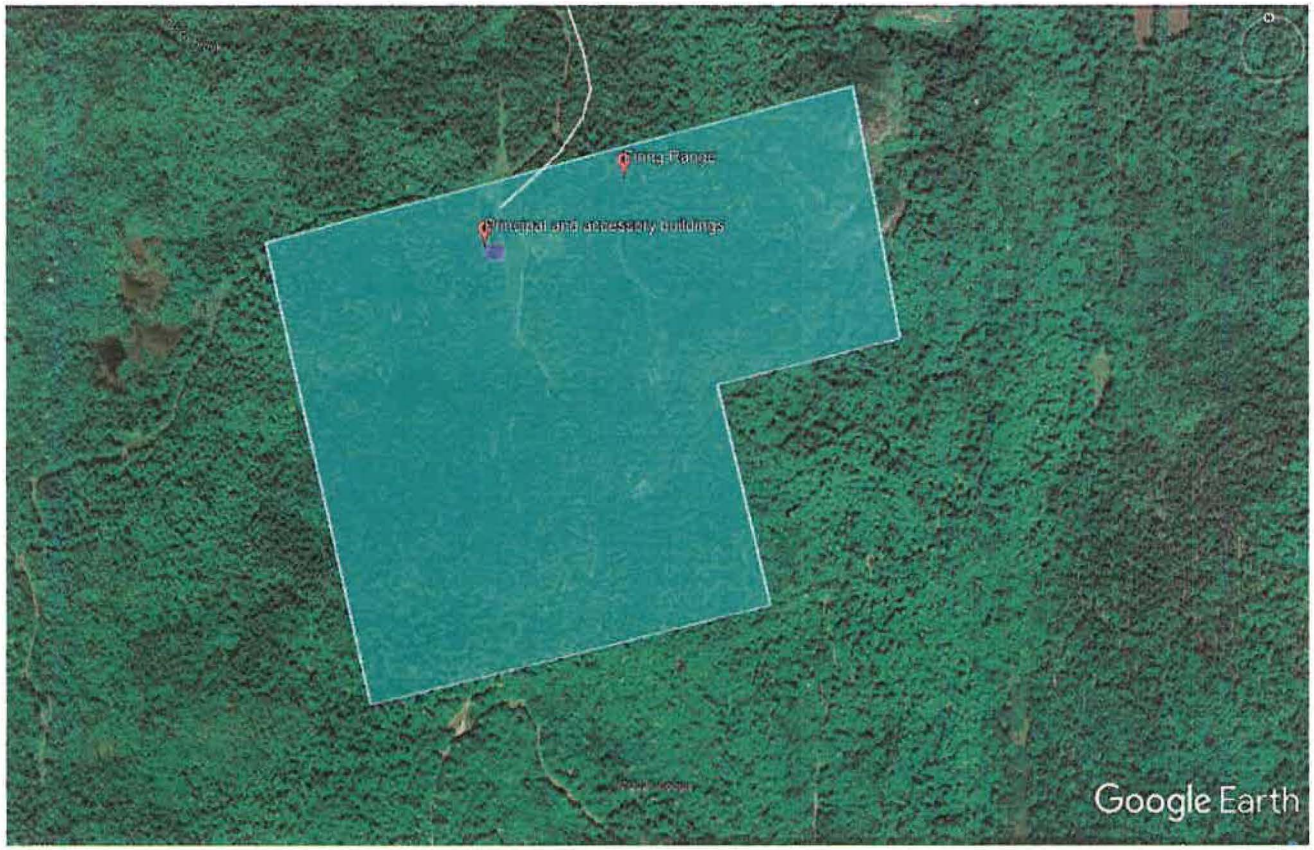
Principal and Accessory Buildings



195 Hale Hill Ln, Lewis, NY is a Seasonal, Cabin, Vacation home built in 1962. It is 1,084 sq ft and contains 3 bedrooms (no baths or running water). Lot size 8,581,320.

Public Property Records; 195 Hale Hill Ln Lewis NY 12950 | realty.com

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Adirondack Park Agency, Division of Regulatory Programs Application

for Commercial and/or Industrial Uses,

Attachment F

39. Deed Restrictions and Easements

Attach, as ATTACHMENT F, any proposed deed language that will restrict further subdivision or development on the project site and any other proposed deed restrictions or easements.

The land is a part of the 480A New York Forest Tax Law Program; the amount of the tax exemption is noted on the deed.

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Attachment J

NEW YORK STATE OF OPPORTUNITY | Adirondack Park Agency

ANDREW M. CUOMO
Governor

TERRY MARTINO
Executive Director

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ADIRONDACK PARK AGENCY
NOV 19 2021

December 2, 2020

Diversified Upstate Enterprises, LLC
Mr. Michael Hopmeier - via email
17 Racetrack Road NW Suite E
Fort Walton Beach, FL 32570

RE: Jurisdictional Determination J2020-0950
Tax Map Parcel 38.1-1-29.000
Land Use Area: Rural Use
Town of Lewis, Essex County

Dear Mr. Hopmeier:

Thank you for your Jurisdictional Inquiry Form received by the Agency on November 19, 2020.

Agency review indicates the proposed construction of an accessory use Quonset hut, as depicted on the sketch map received on November 19, 2020 and described in the materials submitted does not require a permit or variance from the Adirondack Park Agency. Please note that, in making this determination, the Agency has not reviewed the lawfulness of any structure on the property or any past subdivisions involving the property.

Wetland maps available for Essex County indicate that there are no wetlands on the property. Please remember that all activities within the Adirondack Park must comply with the Freshwater Wetlands Act. Please visit the Agency's website for additional information regarding wetlands in the Adirondack Park.

Although your proposal does not require Agency approval, please help to prevent the spread of invasive species by ensuring all excavating tools, fill, and other equipment are thoroughly cleaned and that all fill is free of invasive species prior to use on-site. If any portion of the site contains invasives, all construction equipment and vehicles should be thoroughly cleaned prior to moving to other areas. If the proposal will involve any plantings, care should be taken to avoid the introduction of invasive species. Please see adkinvasives.com for more information on how to prevent the spread of invasive species in the Adirondack Park.

P.O. Box 99 • 1133 NYS Route 86 • Ray Brook, NY 12977 • Tel: (518) 891-4050 • www.apa.ny.gov

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In addition, please be aware of the following information and requirements:

1. No structure other than residential radio and television antennas and agricultural use structures may exceed 40 feet in height without an Agency permit. For Agency purposes, height is measured from the highest point of the structure to the lowest point of finished or natural grade, whichever is lower.

This letter does not authorize the impairment of any easement, right, title, or interest in real or personal property, and shall not be construed to satisfy any legal obligations of the permittee to comply with all applicable laws and regulations or to obtain any governmental approval or permit from any entity other than the Agency, whether federal, State, regional, or local. We recommend that you check with Town authorities and the New York State Department of Environmental Conservation to obtain all necessary approvals prior to commencing the project.

Please do not hesitate to contact the Agency with any questions.

Sincerely,

/s/ Tracy J. Darrah

Tracy J. Darrah
Project Administrator

cc: Town of Lewis - via email

Attachment K

NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

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NOV 19 2021

JURISDICTIONAL INQUIRY FORM
Please submit by email to – apajif@apa.ny.gov

A. INSTRUCTIONS

Submit this form to obtain a written determination whether an Adirondack Park Agency permit or variance is needed for a proposed project. This form is not an application. If you know you need an Agency permit or variance you should not submit this form, but instead you should contact the Agency for the appropriate application form. Information about Agency jurisdiction can be found on the Agency's website (www.apa.ny.gov) and in the Permit Checklist on pages 10 and 11 of the Agency's 'Citizen Guide,' which is also available on the website.

The Jurisdictional Inquiry Form must be signed by a person with a legal interest in the property; only owners, tenants, mortgagees, purchasers under an existing contract of sale, or their attorneys. Please note that if the person under contract to purchase the property signs this form, then a copy of the purchase agreement signed by both parties must be provided.

The legal issues involved in determining jurisdiction are complicated. All of the information requested on this form is necessary in order for us to determine if the proposal requires an Agency permit or variance. The County Clerk's Office, Real Property Tax Services and/or the Town Office may be able to assist you in obtaining property information (i.e., tax map number, history, copies of deeds, etc.).

Please include a copy of the current recorded deed, tax map number, a description of your proposal, including a sketch map, and the necessary signature(s).

WE CANNOT RESPOND TO YOUR INQUIRY WITHOUT THIS INFORMATION

B. GENERAL INFORMATION

	APPLICANT/REPRESENTATIVE:	PROPERTY OWNER (if not applicant):
Name	Michael Hopmeier	James Pulsifer
Mailing Address	620 Herndon Pkwy, Ste	(aka) Philip Pulsifer
	Herndon, VA 20170	
Telephone	703 870 7211	
Email	hopmeier@unconvention	

PROPERTY LOCATION:

Town/Village Lewis County Essex

Road/Highway Hale Hill Ln.

Tax Map Number: (This can be found on your tax bill and it looks something like this... 89.12-1-1.4 - three numbers separated by dashes, and there may not be decimals).

38.1-1-31.000

Section _____ Block _____ Parcel/Lot _____

C. PROPERTY HISTORY

Please include a copy of the current recorded deed for the property

1. Has the property been the subject of any previous Agency permit, variance, map amendment, jurisdictional determination, staff site visit, wetland site visit, or an enforcement action?

   ☐ Yes ☑ No ☐ Don't Know

   If yes, please include the following information:
   File number _____ Agency contact _____

2. What is the acreage or square footage of the property at this time? 197 acres

3. Please describe all structures which currently exist on the property (include type and use of structure, size and construction date of each – for example, confirm if the structure is a mobile home, single family dwelling, barn, storage building, etc.). If your project involves replacement of a structure, please provide its description, even if it has already been removed (and indicate its removal date).

	Structure/Use	Size	Construction Date	Removal Date
a.	N/A, Woodlan			
b.	Hunting Camp (Seaonal			
c.				
d.				
e.				
f.				

D. PROJECT DESCRIPTION

Please check all that apply and fill in the appropriate blanks:

1. ☐ Subdivision
   (a) Number of proposed lots (including any lots being retained). _____
   (b) What is the size of the smallest lot in acres or square feet? _____
   (c) What is the smallest shoreline lot width (if applicable)? _____
   (d) Are any of the proposed lots being conveyed by gift? ☐ Yes ☐ No
   If yes, what is the recipient's relationship to the person giving the lot?
   _____

☐ Construction of a single family dwelling.

☐ Installation of a mobile home.

☐ Construction of a multiple-residence building (____ housing units).

☐ Construction of a commercial, industrial or public building resulting in _____ square feet of building footprint and _____ square feet of floor space (total of all floors).

☐ Expansion of the footprint of an existing _____ square foot structure by _____ additional square feet. For group camps and public buildings, please also provide expansion information for the total of all floor space. **NOTE:** If you are expanding a structure other than a single-family dwelling, also provide the total square footage of the structure as of May 22, 1973.

☐ Are you proposing to install, replace or expand a seepage pit, drainage field or other leaching facility?
Will it be within 100 feet of the mean high water mark of any lake, pond, river or stream (including intermittent streams)? ☐ Yes ☐ No
Will the new system serve an actual or potential occupancy increase of the shoreline structure served?
☐ Yes ☐ No

☐ Replacement of an existing _____ square-foot structure with a new _____ square-foot structure. Confirm the existing and proposed use of the structure.
_____

☐ Conveyance of entire ownership

☑ Other (describe)
Install a ballistic test range using existing mountain as a kinetic energy absorber

2. Does the project involve establishment of a new business? ☐ Yes ☑ No

If yes:
   (a) Will it be operated at your residential property? ☐ Yes ☐ No
   (b) How many people will the business employ who do not live on the premises?
   _____
   (c) How many signs will the business have? _____
   Will they be lighted? ☐ Yes ☐ No
   What will be the combined square footage of the sign(s)? _____
   (d) Please describe the type of business. _____

3. Will the project result in any structures over 40 feet in height (measuring from the highest point of a structure to the lowest point of natural or finished grade, whichever is lower)?
   ☐ Yes ☑ No

   (If the structure is close to 40 feet in height, it will be necessary to provide building elevations [all sides] and a grading plan which shows existing and proposed grade to obtain a jurisdictional determination.)

4. Will the project result in the removal of sand, gravel, topsoil or minerals from the property?
   ☐ Yes ☑ No

5. Will waste material, such as construction debris, be disposed on the property? (This does not include soil and land clearing debris generated from onsite construction activities.)
   ☐ Yes ☑ No If yes, explain the type and volume of debris.

   _____

6. Does the property contain shoreline? ☐ Yes ☑ No
   What will be the distance from the mean high water mark to the closest new structure or expansion? _____ feet
   If an expansion, how far from the mean high water mark is the existing structure?
   _____ feet

   Will the existing roof ridgeline height be increased by more than 2 feet? ☐ Yes ☐ No
   If yes, what is the proposed new ridgeline height in feet above the existing ridgeline height? _____ feet

7. Will any vegetation be cut within 35 feet of a lake, pond, river or stream? ☐ Yes ☑ No
   Your sketch should show the size and type of vegetation to be removed relative to the size and type which will remain.

8. Does the proposal involve provision of any new or additional deeded or contractual access to the shoreline? ☐ Yes ☑ No If yes, provide the number of new or additional lots being provided access (identify by tax map designation) and the width of the access area.

   _____

Invasive Species: For any proposals that will involve the use of excavating tools, equipment, or fill brought from off-site, please remember to help prevent the spread of invasive species by ensuring all tools and equipment are thoroughly cleaned and that all fill is free of invasive species prior to use on-site. If any portion of the site contains invasives, all construction equipment and vehicles should be thoroughly cleaned prior to moving to other areas.

If the proposal will involve any plantings, care should be taken to avoid the introduction of invasive species.

Please see adkinvasives.com for more information on how to prevent the spread of invasive species in the Adirondack Park.

E. SKETCH MAP

(For the purposes of this Inquiry the map does not need to be professionally prepared)

On a separate sheet, provide a scaled sketch map of the property showing acreage, boundaries, and natural features and water bodies. Include the location of all existing and proposed development (including structures, on-site wastewater treatment system, water supply, driveways, roads, and areas of clearing etc.) It should be drawn at a scale which clearly shows the location of all proposed activity, with measurements labeled. For a shoreline parcel, show the lot width along the shoreline and indicate the setback distance from mean high water mark of any existing or proposed structure and sewage system. Also, provide the north arrow, the name of the map maker and date it was prepared.

F. NARRATIVE (Please describe your proposal)

We wish to set up a ballistic test range to support research for the United States Government. The focus will be on measurement and evaluation of the internal ballistics of large bore systems. Once test projectile has exited device, its kinetic energy will be absorbed by existing terrain, and sound reflected back into uninhabited areas. No fixed structure will be constructed, and a small (roughly 200 yrd by 50 yrd) piece of land will be cleared of trees, but existing ground foliage will be left in place. Some terrain modification may be required to stabilize a test pad and improve access to an existing logging/fire trail. This is related to request J2020-0950, attached.

G. CHECK LIST

- ☑ Have you answered all of the questions?
- ☑ Did you include a copy of the current recorded deed?
- ☑ Did you include a sketch map?
- ☑ Is the form signed by an authorized person?
- ☑ Did you provide the tax map identification number?
- ☑ Did you include your return mailing address and phone number?

H. SIGNATURE OF AUTHORIZED PERSON

Note: This form must be signed by a person with a legal interest in the property; only owners, tenants, mortgagees, purchasers under an existing contract of sale, or their attorneys. The use of an electronic signature, by typing in your signature and checking below, shall have the same validity and effect as a handwritten signature. Please fill in the information below and check all applicable boxes.

The above information is correct and accurate to the best of my knowledge.

Michael Hopmeier ☐
Signed (typed)

Hopmeier	Michael	J
Last Name	First Name	Middle Initial

Title (if applicable)

8/25/2021
Date

By submitting this form, I hereby request the Adirondack Park Agency issue a written determination as to whether an Adirondack Park Agency permit or variance is needed for a proposed project.
I attest that I am the person named above and that I am the:
Check one:

- ☐ Owner of the property subject to this jurisdictional inquiry
- ☐ Attorney for owner of the property subject to this jurisdictional inquiry
- ☐ Purchaser of the property subject to this jurisdictional inquiry under an existing contract of sale (a copy of which is attached)
- ☑ Tenant of the property subject to this jurisdictional inquiry under an existing lease (a copy of which is attached)
- ☐ Mortgagee of the property subject to this jurisdictional inquiry (a copy of which mortgage is attached)

If you wish to have another person, such as a contractor, process this inquiry on your behalf, please provide the name and address of that person.

I wish to have _____ complete this inquiry on my behalf.

I. PLEASE SUBMIT BY EMAIL TO – apajif@apa.ny.gov


Attachment L
62
62
Google

Attachment M

NEW YORK STATE OF OPPORTUNITY | Adirondack Park Agency

KATHY HOCHUL
Governor

TERRY MARTINO
Executive Director

RECEIVED
ADIRONDACK PARK AGENCY
NOV 19 2021

September 22, 2021

Michael Hopmeier – via email hopmeier@unconventional-inc.com
620 Herndon Pkwy, Ste 120A
Herndon, VA 20170

RE: Jurisdictional Determination J2021-0870
Tax Map Parcel 38.1-1-31.000
Land Use Area: Rural Use
Town of Lewis, Essex County

Dear Michael Hopmeier:

Thank you for your Jurisdictional Inquiry Form, submitted on behalf of your client and received by the Agency on August 26, 2021.

A permit is required from the Adirondack Park Agency for any new commercial use on Rural Use lands in the Adirondack Park. Accordingly, a permit is required for establishment of the ballistic test range as proposed in your inquiry. In addition, please be aware that any other commercial use on Tax Map Parcel 38.1-1-29 will also require a permit from the Agency.

Please contact Agency staff member Daniel Kelleher with any questions.

Sincerely,

/s/ Tracy J. Darrah

Tracy J. Darrah
Project Administrator
Attachments: Application for Commercial Use

cc: Town of Lewis - via email

1st NIPA

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NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No.: 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	n/a

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – shooting range
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Michael Hopmeier:

Thank you for your permit application, received by the Agency on November 19, 2021. The application provided important information on the proposed project. As listed below, initial evaluation by Agency staff indicates that additional information is necessary to review the project and complete the application.

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov and reference Project Number 2021-0276 in the subject line.

A site visit by Agency staff is required before your application can be determined complete. During site visits, staff review the soils and slopes on a project site, as well as any wetlands, waterbodies, and other resources. Please contact Environmental Program Specialist 1 (EPS1) **Fritz Aldinger** to schedule the site visit; the application will remain incomplete until the site visit has occurred.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice of Incomplete Permit Application or the project review process, please contact EPS Aldinger.

December 6, 2021
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

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REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. **Item 4 Project Site Location**: Please clarify if the lease area for the commercial use consists of a limited area or the entire tax map parcel. If the lease area is only a portion of the property, please provide a site plan depicting the boundaries of the lease area.

2. **Item 8 Detailed Project Description**:
   - Please provide additional details to describe the commercial use that occurs on Tax Map Parcel 38.1-1-29.000 (The missile silo site) including the frequency of use, hours of operation, number of employees, and number of customers expected.
   - The submission states that the use of a container for catching projectiles is not expected to be necessary. Will the fired projectiles be removed from the site if they are not being retained by a container?
   - Please clarify whether any lead or other potential contaminants may be used in the proposed testing area.
   - Please provide a thorough noise evaluation for all proposed munitions to be fired on site, including an evaluation of the nearest receptors utilizing the NYS DEC's Program Policy for Assessing and Mitigating Noise Impacts. Please provide a noise mitigation plan as necessary.
   - Please provide a design report that complies with the USACE Range Design Guide to confirm the proposed range is adequately sized to ensure safety to human health and the environment and meets all applicable standards for range design.
   - Please provide an unexploded ordnance (UXO) plan.
   - Please clarify what the proposed targets will be for testing and if the targets will be mobile or stationary.
   - Please provide a range decommissioning plan and please clarify the proposed methods for disposing of debris and residues.
   - The proposal indicates that the purpose of the commercial use is to support research for Benet Laboratories, a US Department of Army research and development facility. Please explain why this testing cannot be performed on site at the Watervliet Arsenal, or one of the Army's existing testing facilities or other existing facility with infrastructure already in place.

3. **Item 14 Project Employment and other Benefits:** The submission indicates this proposal will allow for the hiring of more personnel. Please provide details regarding the additional personnel, including the number of employees, if these personnel will be employed full time, if they will be working onsite at Tax Map Parcel 38.1-1-29.000 or 38.1-1-31.000, and the time period of employment.

4. **Item 17 – Site Plan:** Utilizing the US Army Corps of Engineers (USACOE) range design guide, please provide a thorough design plan that includes all design requirements including but not limited to the following:
   - A topographic survey of the entire lease area with firing and target locations and elevations depicted;
   - Siting considerations, including the range support facilities and noise impulse contours from each firing position;
   - Target protect design curves;
   - All proposed signage for safety and other purposes;
   - Proposed berms and walls if applicable;
   - Existing and proposed roads;
   - Parking areas; and
   - Range line of sight.

   Please also identify the surface danger zone (SDZ) per Department of Army's PAM 385-63.

5. **Item 19 Proposed Site Access:** Please clarify if any improvements to the existing logging roads are proposed.

6. **Item 46 Stormwater Management Plan:** Please provide a stormwater plan for the proposed 100-foot by 100-foot area of disturbance and the blasting area.

7. **Item 49 Other Regulatory Permits and Approvals**:
   - Please have the Local Government Notice Form completed, signed by the appropriate town official and submitted to the Agency.
   - Please contact the New York State Department of Environmental Conservation regarding your proposal. Please copy the Agency on all correspondence and provide any comments or other response received.
   - Please contact the NYS Police and US Department of Justice regarding the proposed militarized and/or demilitarized firearms and weapons testing facility. Please copy the Agency on all correspondence and provide any comments or other response received.

Enc: Local Government Notice Form

cc: Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, Landowner

1st NIPA Responses

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NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

RECEIVED
Date: December 22, 2021

NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No.: 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	n/a

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – shooting range
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Michael Hopmeier:

Thank you for your permit application, received by the Agency on November 19, 2021. The application provided important information on the proposed project. As listed below, initial evaluation by Agency staff indicates that additional information is necessary to review the project and complete the application.

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov and reference Project Number 2021-0276 in the subject line.

A site visit by Agency staff is required before your application can be determined complete. During site visits, staff review the soils and slopes on a project site, as well as any wetlands, waterbodies, and other resources. Please contact Environmental Program Specialist 1 (EPS1) **Fritz Aldinger** to schedule the site visit; the application will remain incomplete until the site visit has occurred.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice of Incomplete Permit Application or the project review process, please contact EPS Aldinger.

December 6, 2021
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

UCI responses to requested information are in gray; this response package was completed on Dec. 21, 2021.

1. **Item 4 Project Site Location**: Please clarify if the lease area for the commercial use consists of a limited area or the entire tax map parcel. If the lease area is only a portion of the property, please provide a site plan depicting the boundaries of the lease area.

   The leased area is for only a portion of the overall parcel; a map of the leased area is attached as Appendix A.

2. **Item 8 Detailed Project Description**:
   - Please provide additional details to describe the commercial use that occurs on Tax Map Parcel 38.1-1-29.000 (The missile silo site) including the frequency of use, hours of operation, number of employees, and number of customers expected.

     Use of the firing range is not anticipated to affect current operating hours or customer access/use of Tax Map Parcel 38.1-1-29.000. In support of the firing range effort, we currently anticipate hiring two full-time technicians, and expanding our staff to include two additional engineering full-time equivalents (FTEs). Further, during lead-up to and operation of tests, there may be as many as four additional technical staff supporting operations. We also anticipate expanding our use of existing community infrastructure, as we expect to have increased needs for skills such as specialized welding and machining, prototype fabrication, and light to medium manufacturing support.

   - The submission states that the use of a container for catching projectiles is not expected to be necessary. Will the fired projectiles be removed from the site if they are not being retained by a container?

     Yes. In addition, any debris or detritus will be removed at the end of each operation, unless containment is required. If containment is required, the container and debris will be removed and properly disposed of at the completion of the program.

- Please clarify whether any lead or other potential contaminants may be used in the proposed testing area.

  No lead or potential contaminants will be used.

- Please provide a thorough noise evaluation for all proposed munitions to be fired on site, including an evaluation of the nearest receptors utilizing the NYS DEC's Program Policy for Assessing and Mitigating Noise Impacts. Please provide a noise mitigation plan as necessary.

  Information on the noise source based on existing data was provided in UCI's original submission (not expected to exceed 185 dB, for durations of less than 10 milliseconds). The noise generated during testing is considered to be **impulse noise** rather than constant noise. It is vital to note that impulse noise affects people and the environment very differently than continuous noise, and is generally considered less annoying and impactful. In addition, we anticipate no more than two noise events in a single day; most commonly, there will only be a single noise event in a single day.

  Per the APA's request, we have reviewed the NYS DEC's Program Policy for Assessing and Mitigating Noise Impacts (https://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf).

  We used a complex non-linear topographic multi-variate inverse square law model for noise distribution that considered propagation over a distance, insertion of a barrier, ground effect, and air absorption. For purposes of calculations, we used the following values:

  - Noise source (https://pubmed.ncbi.nlm.nih.gov/7761796/)
    - 183 dB
    - Impulse sound (NOT continuous)
    - Peak spectral energy: assumed to be 125 Hz
  - Nearest receptor
    - Silo
    - 1.2 miles (6340 feet, 1930 meters)
    - Any receptor farther away will have greater attenuation, and therefore should experience less noise
  - Single barrier
    - Mountain, analogous to a building
    - Height assumed to be approximately 67 meters (72.3 ft.)
  - Environment
    - 59°F (15C), 70% relative humidity (RH)
  - Ground factor (surface absorption from 0-1)
    - Scale of 0 for hard ground to 1 for soft ground
    - A value of 0.8 was used for the overall ground factor

- The facing surface of the mountain and the majority of the path are either grass, or heavy tree cover and vegetation; there is a small amount of exposed rock. As a result, 0.8 was assumed to be a reasonable value.

The nearest receptor site is approximately 1.2 miles (6336 feet) east (the missile silo); the next closest receptor site is located 1.22 miles (6440 feet) to the ENE (Pulsifer residence). Assuming an impulse sound level of 183 dB at the source, we can anticipate a reduction at both sites to approximately **82 dB centered on 125 Hz peak energy frequency, or a reduction of 101 dB.** This model and these assumptions are generally considered to be conservative; thus, actual noise levels are likely to be much lower, by as much as 3-5 dB. Appendix B provides details of these results.

To provide context for the values above, the noise from a 12 gauge shotgun with an 18.5-inch barrel is approximately 160 dB, the noise from a .30-06 rifle is approximately 163 dB, and the noise from a .357 Magnum is approximately 164 dB. A chainsaw is approximately 105 dB – 120 dB, the thunder from a nearby lightning strike is approximately 120 dB, and a rock concert may range from 110 dB – 140 dB. Note that these latter examples are again continuous noise, not impulse noise, so their effects are much greater and more significant than the noise that will be produced at the range. Nonetheless, the noise at the receptor site is still projected to be at or below a wide array of existing and approved noise sources.

The noise level anticipated at the nearest receptor site is approximately 70-80 dB BELOW that of common hunting weapons regularly used in the area.

The Army (specifically, the US Army Center for Health Promotion and Preventive Medicine, Hearing Conservation Program) considers anticipated noise levels of 185 dB *at the firing site* to be medium to high (depending on charge size), but these levels are nonetheless below the training exposure limits for protected soldiers adjacent to firing systems (source: Noise Levels of Army Equipment, 12/27/2006, available at https://www.nrc.gov/docs/ML0701/ML070120304.pdf). These limits are based on training operations, which are multiple and frequent events. As we anticipate only a very small number of events over an extended period of time, we are WELL BELOW acceptable exposure limits for this type of occurrence.

Appendix B provides a summary and noise attenuation map based on the modeling of the specified assumptions.

MITIGATION: For noise impact mitigation, we propose to use a procedure similar to that used by a local mining operation to notify the local community,

and we anticipate not exceeding existing blast noise levels produced by current mine explosive operations. Specifically, we will notify all receptors recommended by the local town leadership of a planned test (date, time window, and number of events) a minimum of one (1) week prior to the planned event; this notification will be via mail and by phone. We will provide a point of contact and contact information in the letter we send; anyone with questions may contact that person. In addition, we will notify local emergency management the morning of each test and ensure we have open communications with local responders to confirm any tests and answer any questions that may arise. This procedure will be incorporated as part of the site security and safety operations plan.

Based on existing data and assessment, noise levels are not anticipated to exceed those produced by blast operations that are currently occurring one mile from the proposed site of the firing range. However, our current plan is to initially fire small but increasing charges, measure their effect, and mitigate sound where necessary as the charge size is increased. We have already proven this ability by successfully mitigating other noise events.

- Please provide a design report that complies with the USACE Range Design Guide to confirm the proposed range is adequately sized to ensure safety to human health and the environment and meets all applicable standards for range design.

  This requirement is unclear. The USACE Range Design Guide (available at https://www.hnc.usace.army.mil/Missions/Installation-Support-and-Programs-Management/Range-and-Training-Land-Program/Range-Design-Guide/) is for *training ranges.* The proposed firing range is not a training range; it is a specialized range to support research, development, and experimentation. We will be working closely with the US Army Development Command, arguably the world leader on these research questions; they will provide guidance and approval for the range design and operating procedures prior to allowing operations to occur.

  In addition, this is a test and evaluation range that will use equipment and systems provided by the US Army for test and evaluation. All operations will be in accordance with either approved and designated Army protocols, or based on best engineering and technical judgment developed in coordination with relevant Army staff and personnel. Given the novel nature of the testing and instrumentation used, a boilerplate standard safety plan cannot be developed. Rather, specialized analysis and assessment based on each individual event will be performed to develop standard operating procedures (SOPs) for operations.

- Please provide an unexploded ordnance (UXO) plan.

  There will be no unexploded ordnance, so a UXO plan is not required.

- Please clarify what the proposed targets will be for testing and if the targets will be mobile or stationary.

  In the event a target is used, it will be a fixed, static, kinetic energy-absorbing system (otherwise known as a soft-catch system) designed to slow and stop projectiles through controlled absorption and dispersion of kinetic energy. The current design envisions a contained quantity of sand or soil (approximately 8 × 8 × 40 ft) into which projectiles will be fired. Fired projectiles will be recovered from the system when appropriate. This design may be modified based on actual operation and empirical data. If operations do not require a target, then direct impact into the ground in a designated and defined safe area will be used and projectile recovery will be utilized.

- Please provide a range decommissioning plan and please clarify the proposed methods for disposing of debris and residues.

  No decommissioning will be required, as no residue will remain. Projectiles used during testing will normally consist of solid billets of steel, which are anticipated to remain intact upon impact. They will be removed, in whole, upon test completion. They do not present an environmental hazard, as the steel does not contain any elements that are harmful to the environment.

  Upon completion of the test program, the property will revert back to the owners in a condition similar to when it was first leased. Any damage will be repaired to the satisfaction of the owners prior to termination of the lease.

- The proposal indicates that the purpose of the commercial use is to support research for Benet Laboratories, a US Department of Army research and development facility. Please explain why this testing cannot be performed on site at the Watervliet Arsenal, or one of the Army's existing testing facilities or other existing facility with infrastructure already in place.

  The Army evaluated our proposed effort and made a determination to award the work to our company. This decision was made by the Army Program Manager through the acquisition process.

  Other sites beyond the one proposed in this application were considered. However, this site had a unique combination of attractive terrain reflecting sound away from inhabited, sensitive, and public spaces and receptors; isolation allowing enhanced security and safety; and an existing cleared area that would minimize the need to impact or alter the existing terrain and

vegetation. In addition, the proposed site has existing access such as logging roads, which further minimizes the need for modification of the area.

3. **Item 14 Project Employment and other Benefits:** The submission indicates this proposal will allow for the hiring of more personnel. Please provide details regarding the additional personnel, including the number of employees, if these personnel will be employed full time, if they will be working onsite at Tax Map Parcel 38.1-1-29.000 or 38.1-1-31.000, and the time period of employment.

Current documentation provided by the APA is not well suited to this application. The firing range will be staffed only at those times during which testing is in progress. Specific details for broader staffing cannot be provided at this point in time, as the research has yet to begin. However, the impact to the local economy is expected to exceed $1 million annually.

Use of the firing range is not anticipated to significantly affect current operating hours or customer access/use at the silo. For work related to the firing range, we currently anticipate hiring two full-time technicians, and expanding staff to include two additional engineering FTEs. Further, during the lead-up to and operation of tests, there may be four or more additional technical staff supporting operations. We also anticipate expanding our use of existing community infrastructure, as we expect to have increased needs for skills such as specialized welding and machining, prototype fabrication, and light to medium manufacturing support. Given the type of work currently performed, we do not anticipate any impact on community infrastructure such as increased traffic, or any noticeable changes beyond the environs of the facility.

4. **Item 17 – Site Plan:** Utilizing the US Army Corps of Engineers (USACOE) range design guide, please provide a thorough design plan that includes all design requirements including but not limited to the following:
    - A topographic survey of the entire lease area with firing and target locations and elevations depicted;
    - Siting considerations, including the range support facilities and noise impulse contours from each firing position;
    - Target protect design curves;
    - All proposed signage for safety and other purposes;
    - Proposed berms and walls if applicable;
    - Existing and proposed roads;
    - Parking areas; and
    - Range line of sight.

Please also identify the surface danger zone (SDZ) per Department of Army's PAM 385-63.

As noted earlier, the USACE Range Design Guide is not applicable to this effort. Further, as stated in the introduction of the Design Guide, “these provisions do not apply to development, proof of concept, and function of test ranges, or laboratories.” In addition, Army Pamphlet 385-63, Range Safety, explicitly states “these provisions do not apply to development, proof and function test ranges, or laboratories.” (The pamphlet is available at https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/p385_63.pdf.) These applications are normally analyzed on a case-by-case basis, and are designed both to be safe and to meet the required operational criteria of the experimentation they are intended to perform. This process usually entails an array of technical experts, engineers, and operators assessing operations and infrastructure on a dynamic, real-time basis, focused on a risk management approach. Safety is paramount in these considerations, and mitigation methodologies are under constant assessment. This is an on-going and continuous process, and includes the evaluation of all aspects of operations.

Appendix F provides a notional layout of the equipment, an image and diagram of the entire range, and an overview of the existing general area.

Nonetheless, to address the specific issues you have raised above, we provide the following:

- A topographic survey of the entire lease area with firing and target locations and elevations depicted;
    - Based on discussions during the site review, it did not appear that a topographic map of greater resolution than that provided previously was needed. Rather, we have provided an elevation profile chart showing change in elevation over the range and the adjacent area (Appendix C). We included a topographic map of the leased area and of the entire property (parcel 38.1-1-31.000) in our original submission. Those maps are included in this package as Appendix D and Appendix E, respectively. Please provide further guidance and a source for acceptable topographic information if what is provided in this package is not sufficient.
- Siting considerations, including the range support facilities and noise impulse contours from each firing position;
    - An updated layout of the range support facilities is included as Appendix F. The noise attenuation was referenced previously in this response package; it is included as Appendix B.
- Target protect design curves;
    - Not applicable
- All proposed signage for safety and other purposes;
    - The designated location is currently behind a locked gate, and there is extensive signage throughout the property noting that it

is closed, private property and thus is not available for general access. In addition, extra signage will be provided in two concentric layers around the firing range (a diagram is provided in Appendix F). The additional signage will note that a higher level of concern and significant danger exists in proximity to the site, and a POC will be listed. All points of access will also be so demarked.
    - In addition, for safety purposes, the entire firing area will be monitored by direct line-of-sight observation, and the range safety control officer will have the ability to instantly stop any firing process in the event of unauthorized or unsafe incursion. We also anticipate use of special purpose surveillance and security systems to ensure and maintain current situational awareness; such systems will be deployed and removed in coordination with testing operations. Finally, we will maintain close coordination and communication with local law enforcement and security forces to ensure that any issues are addressed and dealt with appropriately.
- Proposed berms and walls if applicable;
    - Not applicable
- Existing and proposed roads;
    - On-site roads were denoted in the original submission package; that map is included here as Appendix G.
- Parking areas; and
    - The original submission requested information on “public roadways, bridges, railroads, and parking lots”. There are no public facilities on the property.
    - An area available for private parking for vehicles and personnel supporting testing is marked on the map in Appendix H.
- Range line of sight.
    - This request is unclear. The range has a length of less than 300 yards, and the entire firing area is within clear line of sight of the firing pad.

5. **Item 19 Proposed Site Access:** Please clarify if any improvements to the existing logging roads are proposed.

No improvements to the existing logging roads are proposed. Only maintenance to maintain them in their current state is anticipated.

6. **Item 46 Stormwater Management Plan:** Please provide a stormwater plan for the proposed 100-foot by 100-foot area of disturbance and the blasting area.

Given that the area of construction is an existing cleared area and no redirection of stormwater is anticipated, we do not believe a stormwater runoff plan is required. No significant alteration in landscape or terrain is anticipated, and any surface reinforcement will use permeable material with no adhesives, thereby providing little change to current in situ strata absorption properties. In addition, the TOTAL proposed area for the ENTIRE firing pad is well less than 1 acre and is not located anywhere near existing water courses, wetlands, estuaries, or any other sensitive formations.

7. **Item 49 Other Regulatory Permits and Approvals**:

- Please have the Local Government Notice Form completed, signed by the appropriate town official and submitted to the Agency.

  The completed form was submitted as a separate email. It is also included in this package as Appendix I.

- Please contact the New York State Department of Environmental Conservation regarding your proposal. Please copy the Agency on all correspondence and provide any comments or other response received.

  We have initiated contact with the DEC to determine the correct POC for this project within their organization. Further information will be provided if/when we receive a response from them.

- Please contact the NYS Police and US Department of Justice regarding the proposed militarized and/or demilitarized firearms and weapons testing facility. Please copy the Agency on all correspondence and provide any comments or other response received.

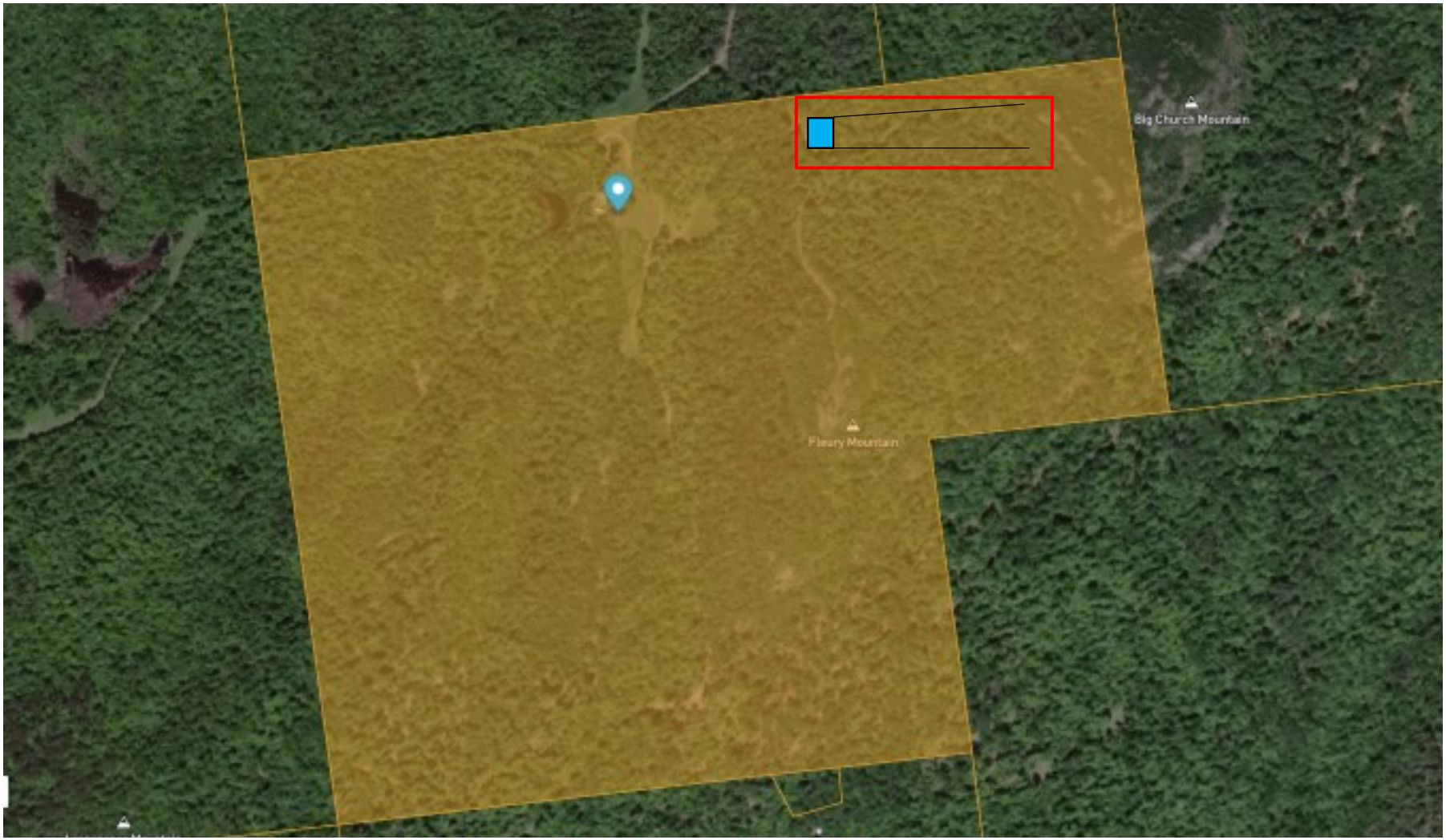
  This requirement is unclear. We currently hold all of the permits and licenses we believe are required.

  We currently hold a Class 1 and 2 Federal Explosives License and a Type 10 Federal Firearms Permit, as well as a New York State explosives license and licenses for all storage facilities. We are not aware of any further licensing required. The copies of the following licenses and certificates are provided in Appendix J:

  1. J-1: Federal Explosives License 6-NY-01206
  2. J-2: Federal Explosives License 6-NY-01207
  3. J-3: Federal Firearms License 6-14-031-10-3K-02530
  4. J-4: State of New York Explosives License D-5826
  5. J-5: State of New York, Explosives Magazine Certificate

Appendix A: Map of leased area

Property parcel 38.1-1-31.000 is overlaid in orange on the map below. The leased area includes only the site of the shooting range; this area is marked with the red rectangle.



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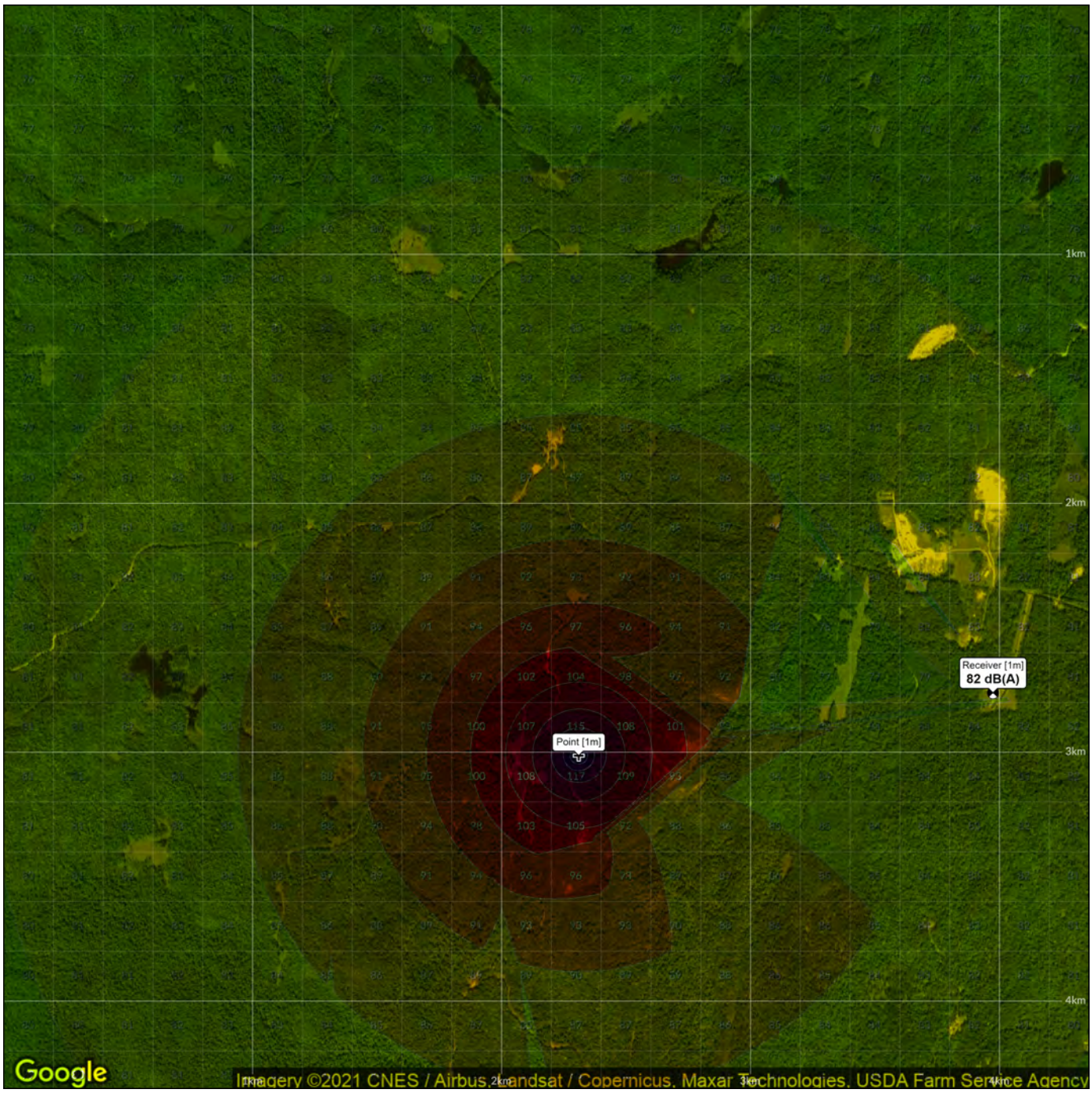
dBmap.net - Noise Mapping Results

Report

12/20/2021

Noise Map - Grid height 1m



20 dB(A)
40 dB(A)
60 dB(A)
80 dB(A)
100 dB(A)
120 dB(A)
140 dB(A)
160 dB(A)
180 dB(A)
200+ dB(A)

0m 1km

Model Overview



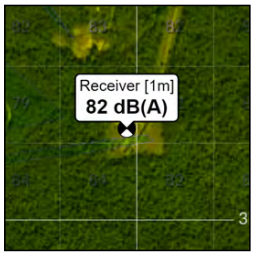
Receiver Results - Summary

Receiver Name	Height (m)	Overall Level dB	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Receiver	1	82			82						

Sources

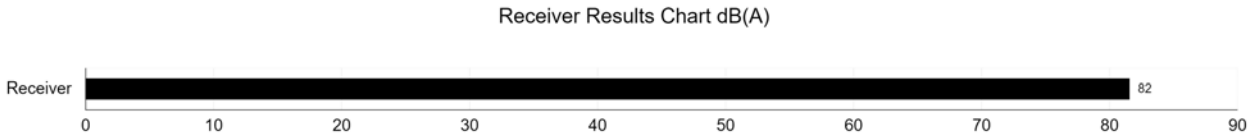
Source Name	Height (m)	Overall Level dB	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Point	1	183			183						

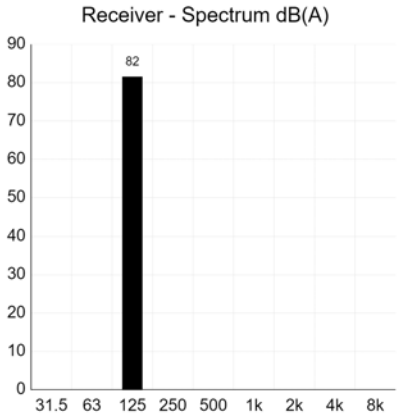
Receiver Locations



Receiver

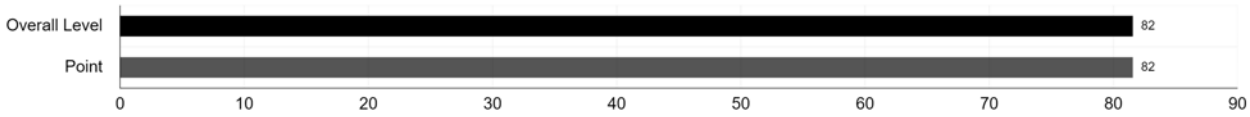
Receiver Charts



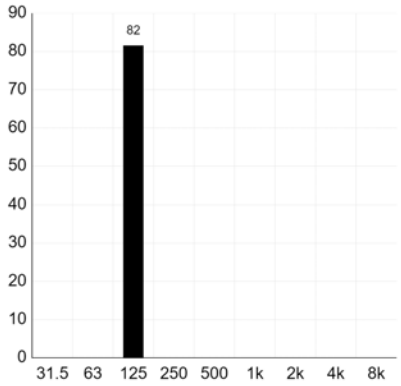


Receiver

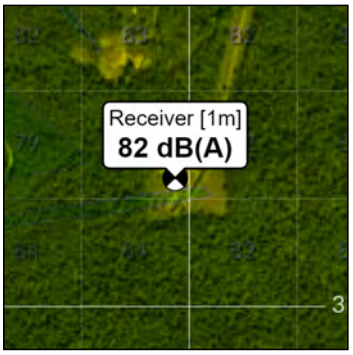
Receiver - Analysis of Sources Chart dB(A)



Receiver - Spectrum dB(A)



Location



Configuration

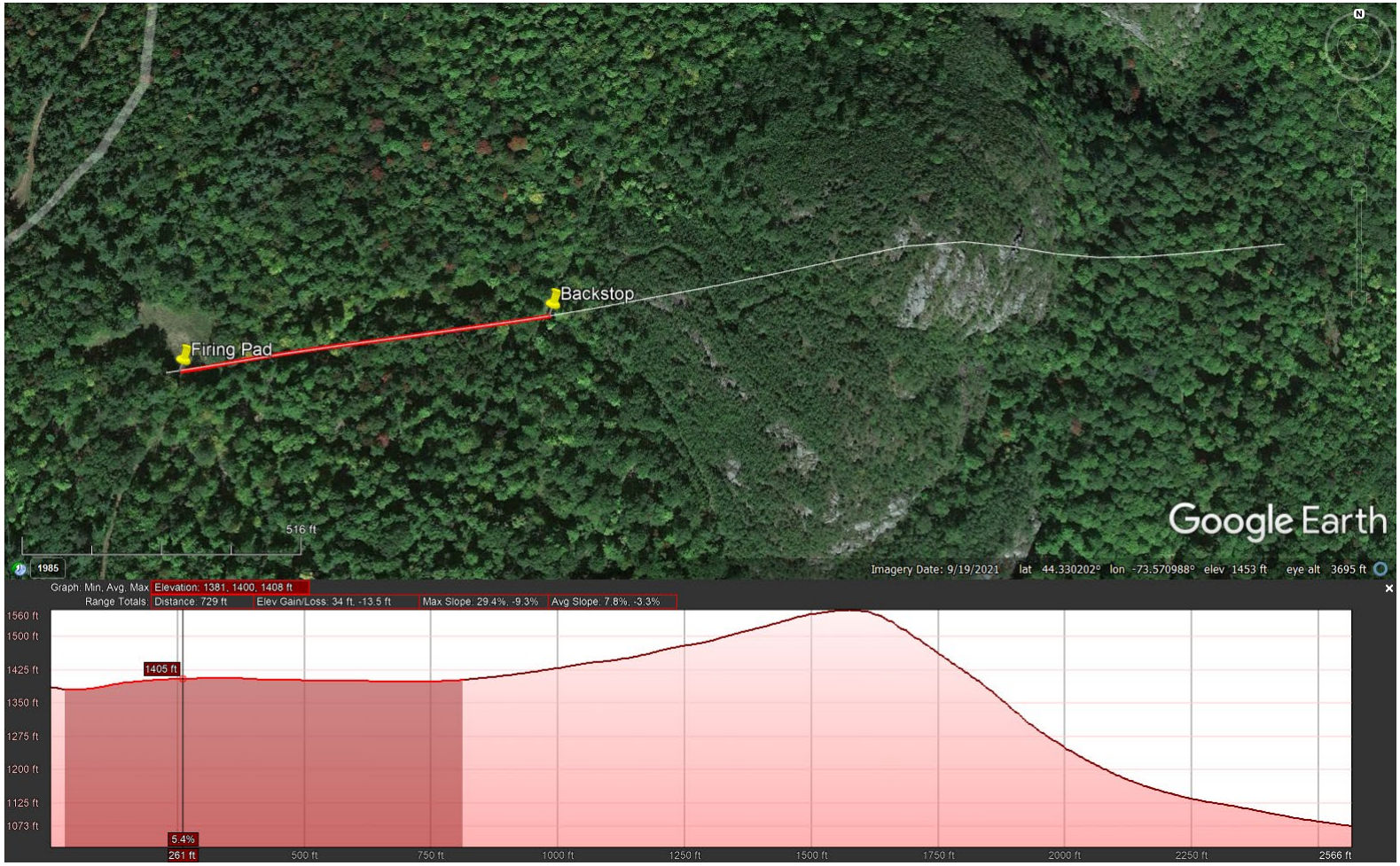
Heights for all calculation results are relative to ground level
0.8G Ground Factor
15°C Temperature
70% Humidity
Ground reflections are screened (original ISO9613-2 method)
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included

References

ISO 9613-1:1993 — Attenuation of sound during propagation outdoors — Part 1: Calculation of the absorption of sound by the atmosphere
ISO 9613-2:1996 — Attenuation of sound during propagation outdoors — Part 2: General method of calculation
ISO/TR 17534-3:2015 — Acoustics — Software for the calculation of sound outdoors — Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1. Quality Assurance and Test Cases: https://dbmap.net/iso17534results

Appendix C: Altitude Curve of the Proposed Firing Range

The Firing Pad and Backstop locations are marked on the map with labeled pins. The white line is the baseline for the altitude profile provided in red at the bottom of the image. The red shaded area in the altitude profile is the change in altitude over the distance between the firing pad (left end) and the backstop (right end). Note the mountain behind the backstop.



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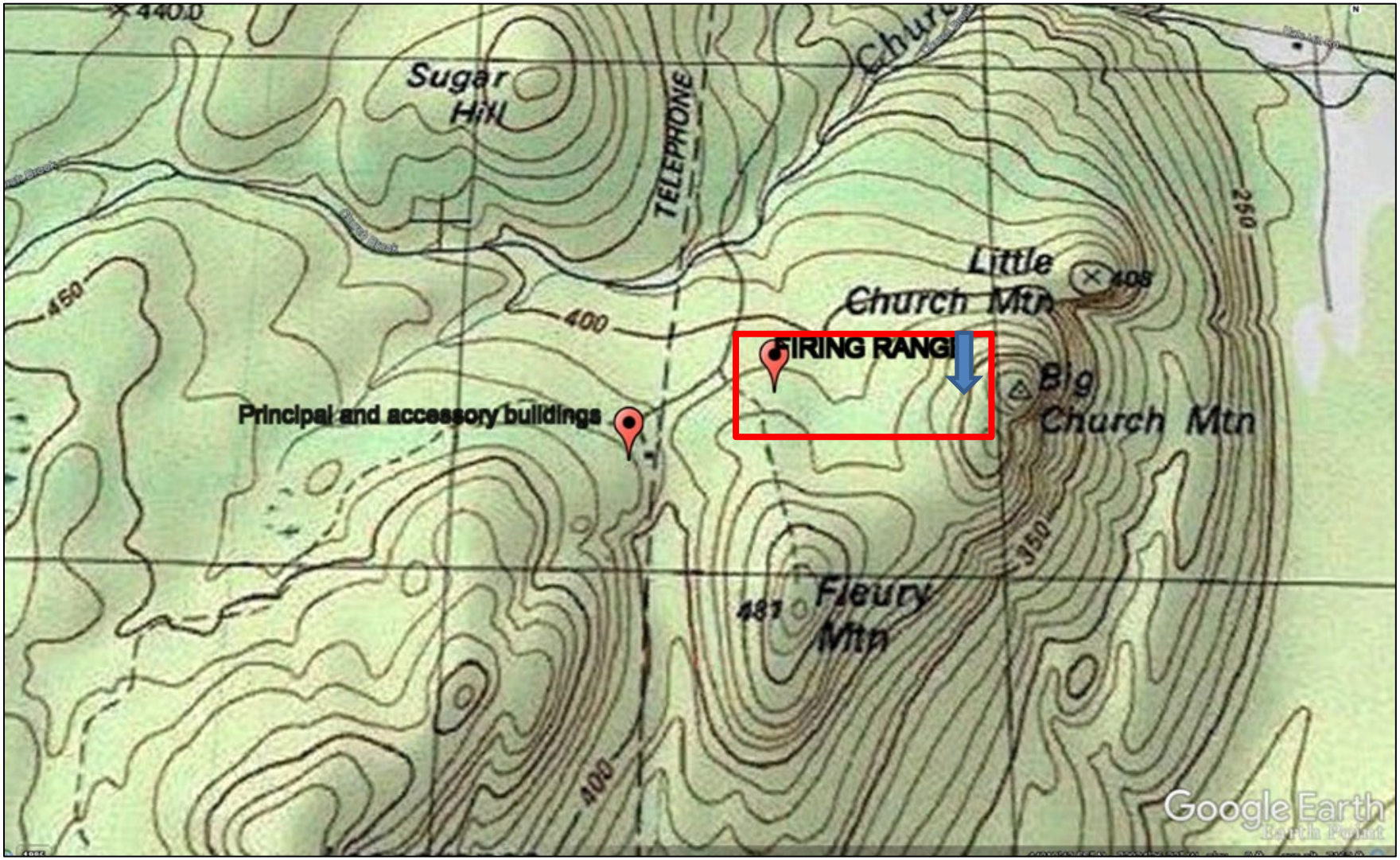
Appendix D: Topographic Map of Leased Area

The leased area is denoted by the red rectangle. The location of the firing pad is denoted by the labeled pin within that rectangle; the target area is denoted by the blue arrow.



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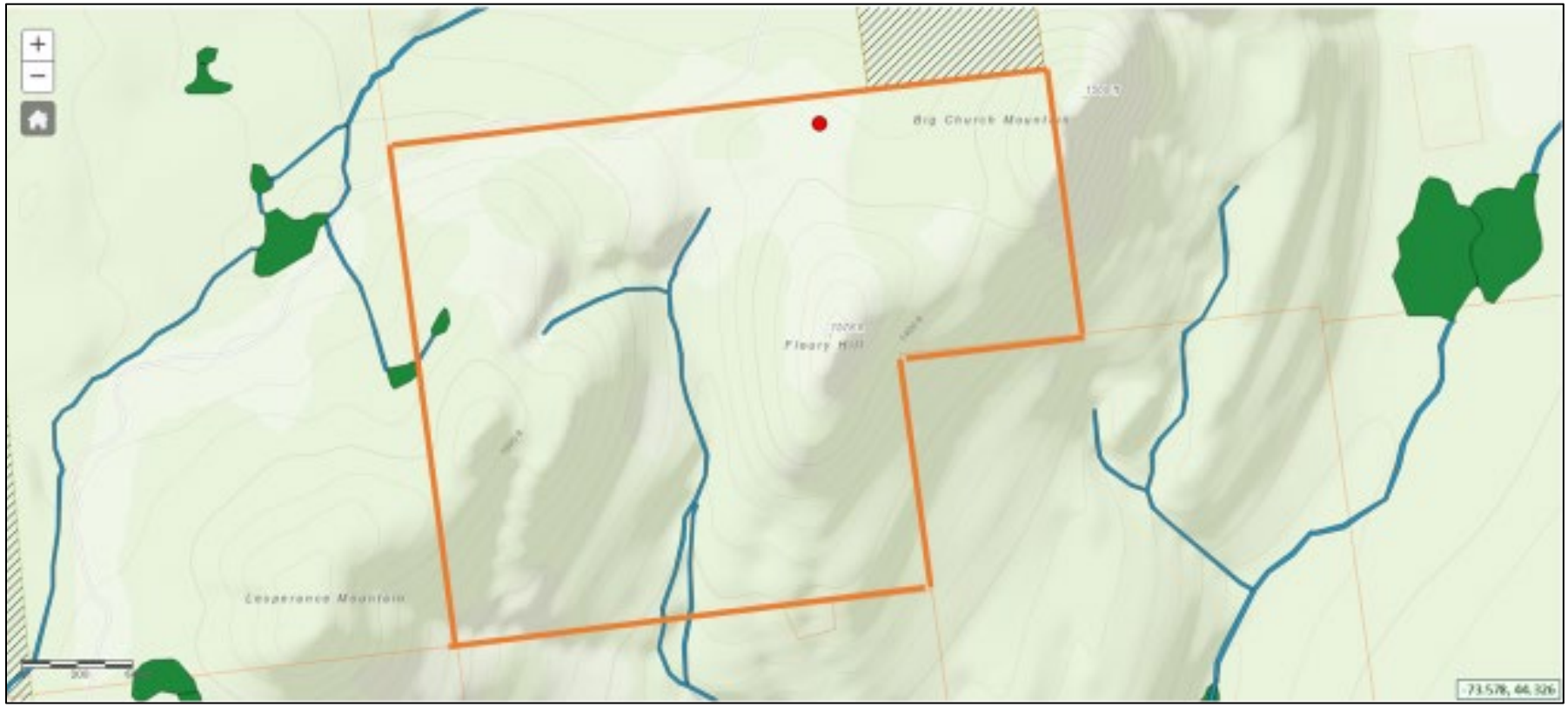
Appendix E: Topographic Map of Entire Property Parcel

The topographic map below was included with the original submission. It is a map of the entirety of property parcel 38.1-1-31.000, including waterways. The location of the firing range is marked in red.



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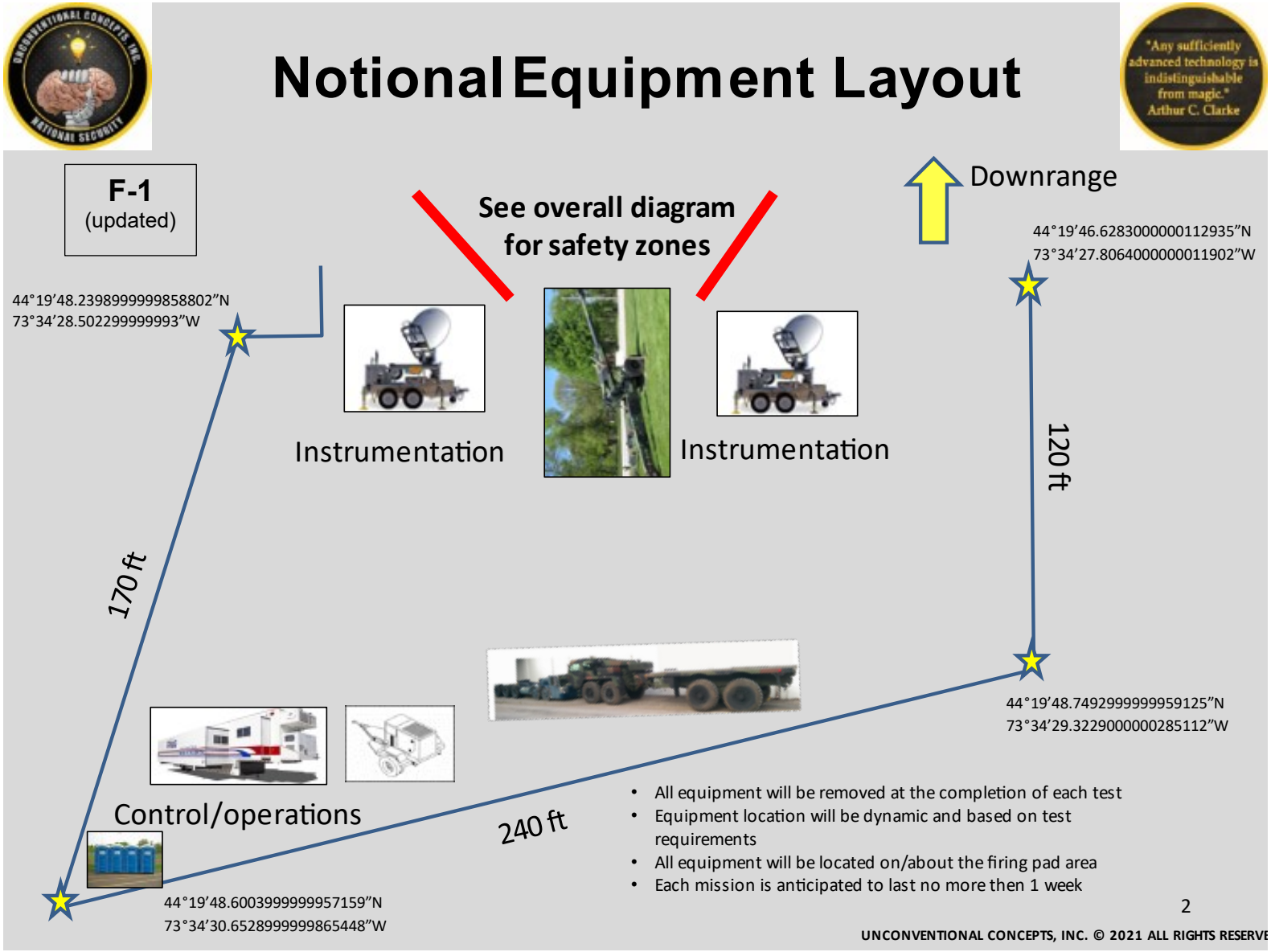
Appendix F: Notional Diagram of Equipment Layout

Three images are provided in this appendix. Image 1 is a revised notional layout of equipment on the firing pad at the firing range. Image 2 is a revised layout of the entire range, with the locations of the firing pad, danger zones, and the safety zone marked. Image 3 shows the location of the range in relation to the silo and other local landmarks.



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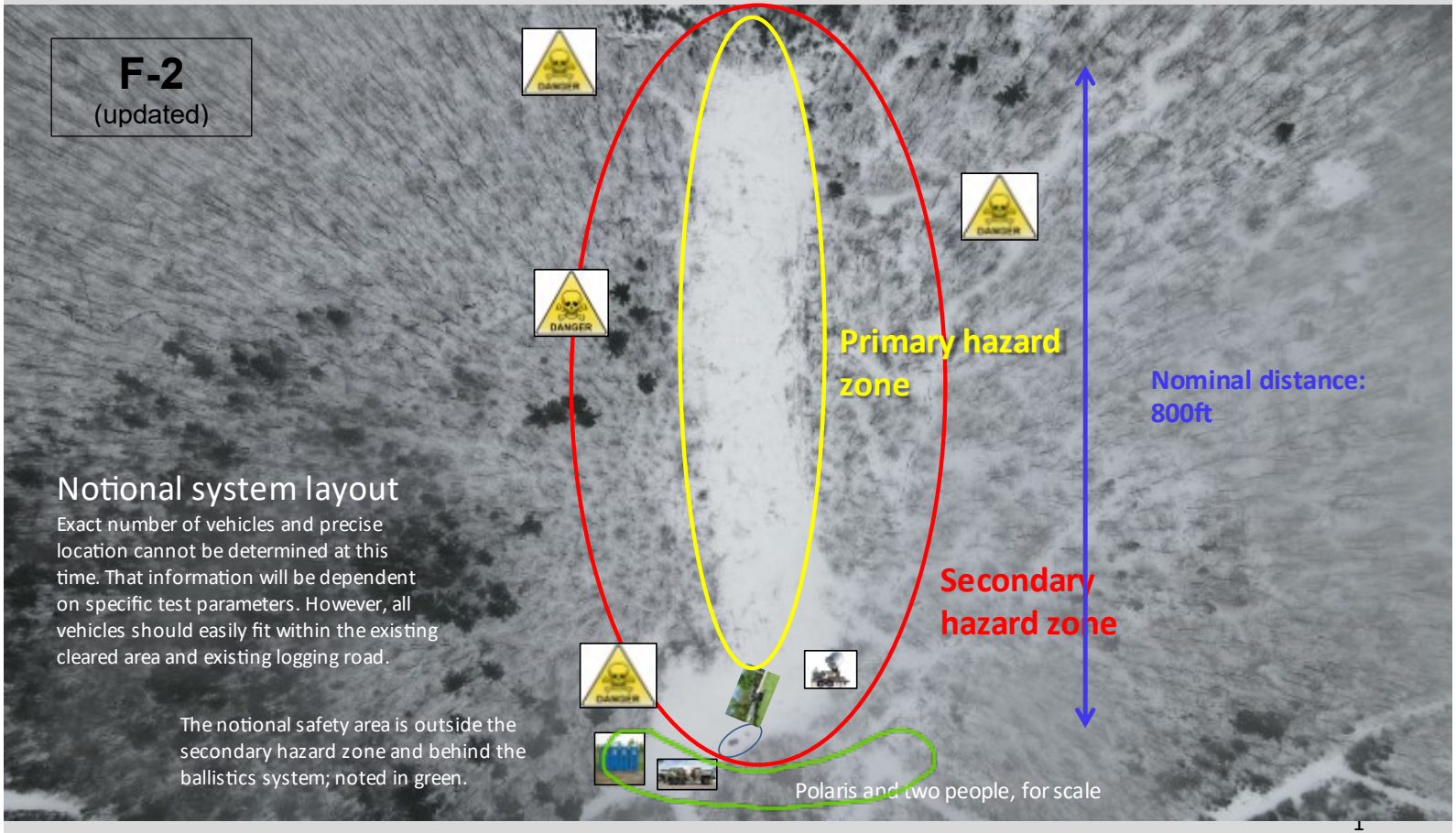
Range Overview

"Any sufficiently advanced technology is indistinguishable from magic."
Arthur C. Clarke



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F-3
Existing access road
Firing pad
Firing lane
Missile Silo
About 4000 ft
Big Church Mountain

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Appendix G: Existing and Proposed Roads

The property parcel is denoted by the blue overlay; the firing pad location of the firing range is marked with a pin. There are no public roads on the property in question. There is one private roadway on the property; it intersects with public road Hale Hill Lane. The private roadway has the following characteristics: DOT ID: 105467; Length: 0.45 miles; Pvt Type: U; Pvt Width: 20 ft; Shoulder Width: 2 ft; Source: 2021 LHI Local Roads and Streets, Region 1.pdf (ny.gov), Page 189, accessed 06/22/21. No new roads are proposed.



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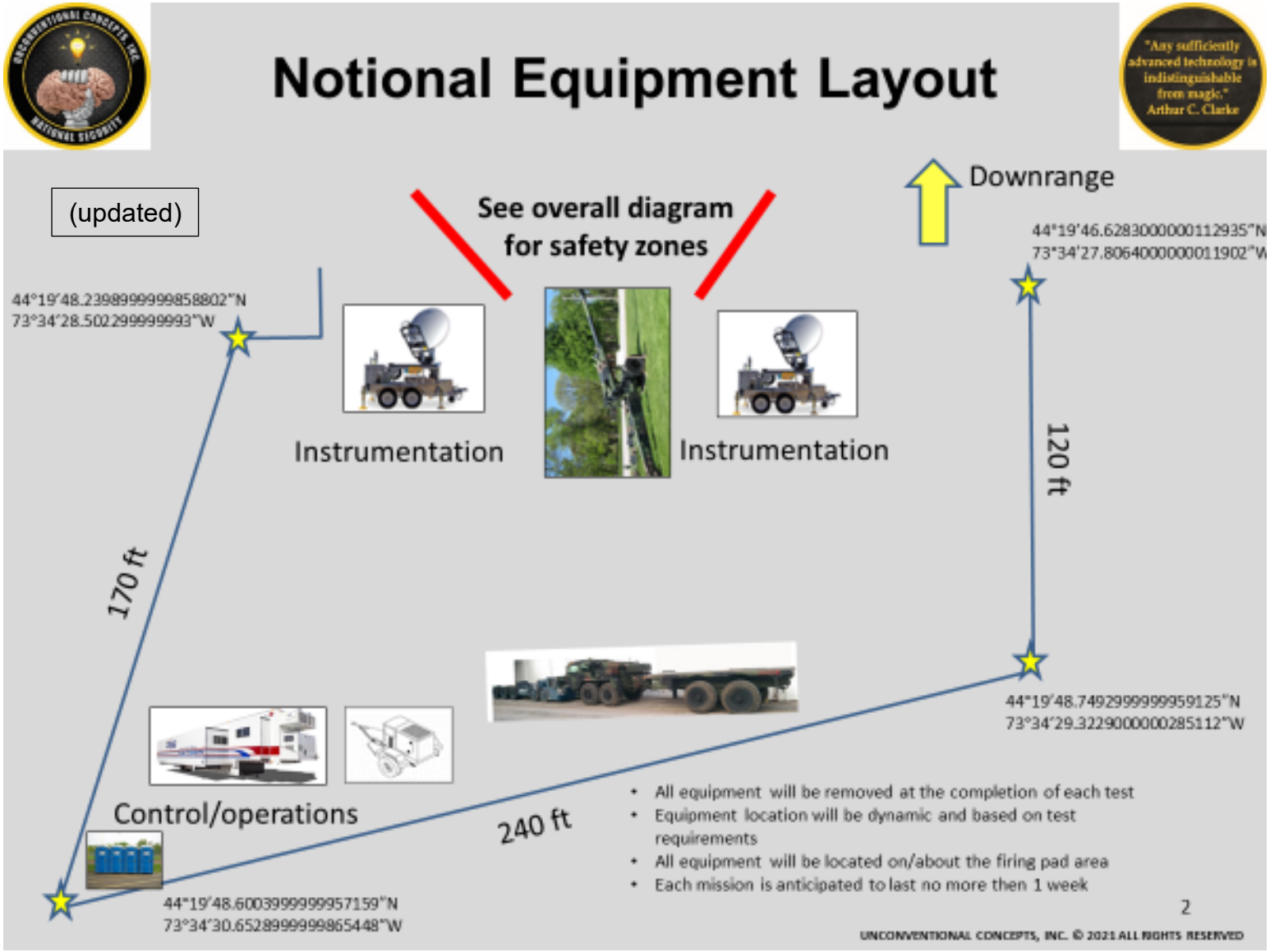
Appendix H: Parking Areas



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Appendix I

NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

LOCAL GOVERNMENT NOTICE FORM
for Project/Variance Application to the Adirondack Park Agency

The Adirondack Park Agency will not deem an application complete until the appropriate municipal official in the Town/Village where a project is located has completed, signed and returned this form to the Agency.

If the Town/Village where the project site is located has zoning or other regulations which apply to the proposal, the Adirondack Park Agency will be unable to issue a permit if: (a) the Town/Village has either refused to grant a necessary permit or variance, or (b) the proposal is a prohibited use in that jurisdiction.

To be completed by the Applicant: APA Project Number (if available): 2021-0276

Applicant Name: UCI/Michael Hopmeier Landowner Name: James Pulsifer

Project site location: Town/Village: Lewis, NY Tax Map Number: 38.1-1-31.000

Project type/description: Firing Range

If the project involves a subdivision, please provide the appropriate local official a copy of the proposed plat as part of the project description with the plan title and date recorded in the space provided above.

To be completed by the Town/Village:

Does the Town/Village have land use controls? ..... ☐Yes ☒No

If Yes, please complete 1-9 below. If No, please skip to #9 below.

1) If the Town/Village has zoning, provide Zoning District Name(s): _____

2) How is the "use" defined under the local code? _____

Is the "use" allowed in the zoning district(s)? ..... ☐Yes ☐No

3) Is the project prohibited by any local law or ordinance? ..... ☐Yes ☐No

4) Does this project require a municipal permit? ..... ☐Yes ☐No

a) If Yes, is the required permit a building permit only? ..... ☐Yes ☐No

b) If No, identify the type of permit required: _____

5) Does this project require a municipal variance? ..... ☐ Yes ☐ No

If Yes, identify the type of variance required (e.g., area, setback, etc.) _____

6) Does the project require any other municipal approval? ..... ☐Yes ☐No

If Yes, identify the approval required: _____

7) Has the municipality received an application for this project? ..... ☐Yes ☐No

If Yes, has the municipality issued any decision on this project? ..... ☐Yes ☐No

8) Provide explanation for any decisions on this project or inconsistencies the project may have with local laws or any comments you wish to provide to the Agency about the project: _____

9) Please provide a daytime contact telephone number with the best days/times to be reached, and/or an email address for the official signing this form, should Agency staff have further questions regarding municipal review of this project: (____)_____ best times_____

e-mail:_____

James Monty Town Supervisor

Signature of Zoning Official or Planning Board Chair (or Supervisor/Mayor if no such official exists)

James Monty Town Supervisor — 12/7/2021

Name and Title (Print) ***Date***

Please return this completed & signed form to the address or fax number below.

P.O. Box 99 • 1133 NYS Route 86 • Ray Brook, NY 12977 • Tel: 518 891-4050 • Fax: 518 891-3938 • www.apa.ny.gov

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Appendix J-1

U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

Federal Explosives License/Permit
(18 U.S.C. Chapter 40)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555), you may engage in the activity specified in this license or permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. **THIS LICENSE IS NOT TRANSFERABLE UNDER 27 CFR 555.53.** See "WARNINGS" and "NOTICES" on reverse.

Direct ATF Correspondence To	ATF - Chief, FELC 244 Needy Road Martinsburg, WV 25405-9431	License Permit Number	**6-NY-031-20-3D-01206**
Chief, Federal Explosives Licensing Center (FELC)	Christopher R. Reeves	Expiration Date	**April 1,2023**

Name
UNCONVENTIONAL CONCEPTS INC

Premises Address (Changes? Notify the FELC at least 10 days before the move.)
87 HALE HILL LN
LEWIS, NY 12950-

Type of License or Permit
20-MANUFACTURER OF EXPLOSIVES

Purchasing Certification Statement

The licensee or permittee named above shall use a copy of this license or permit to assist a transferor of explosives to verify the identity and the licensed status of the licensee or permittee as provided by 27 CFR Part 555. The signature on each copy must be an origina signature. A faxed, scanned or e-mailed copy of the license or permit with a signature intended to be an original signature is acceptable. The signature must be that of the Federal Explosives Licensee (FEL) or a responsible person of the FEL. I certify that this is a true copy of a license or permit issued to the licensee or permittee named above to engage in the business or operations specified above under "Type of License or Permit."

Mailing Address (Changes? Notify the FELC of any changes.)

UNCONVENTIONAL CONCEPTS INC
17 RACETRACK RD NW STE E
FORT WALTON BEACH, FL 32547-

Licensee/Permittee Responsible Person Signature _____ Position Title _____

Printed Name _____ Date _____

Previous Edition is Obsolete UNCONVENTIONAL CONCEPTS INC:87 HALE HILL LN:12950:6-NY-031-20-3D-01206:April 1,2023:29-MANUFACTURER OF EXPLOSIVES

ATF Form 5400.14/5400.15 Part I
Revised October 2011

Federal Explosives License (FEL) Customer Service Information

Federal Explosives Licensing Center (FELC)
244 Needy Road
Martinsburg, WV 25405-9431

Toll-free Telephone Number: (877) 283-3352
Fax Number: (304) 616-4401
E-mail: FELC@atf.gov

ATF Homepage: www.atf.gov

Change of Address *(27 CFR 555.54(a)(1))*. Licensees or permittees may during the term of their current license or permit remove their business or operations to a new location at which they intend regularly to carry on such business or operations. The licensee or permittee is required to give notification of the new location of the business or operations not less than 10 days prior to such removal with the Chief, Federal Explosives Licensing Center. The license or permit will be valid for the remainder of the term of the original license or permit. **(The Chief, FELC, shall, if the licensee or permittee is not qualified, refer the request for amended license or permit to the Director of Industry Operations for denial in accordance with § 555.54.)**

Right of Succession *(27 CFR 555.59)*. (a) Certain persons other than the licensee or permittee may secure the right to carry on the same explosive materials business or operations at the same address shown on, and for the remainder of the term of, a current license or permit. Such persons are: (1) The surviving spouse or child, or executor, administrator, or other legal representative of a deceased licensee or permittee; and (2) A receiver or trustee in bankruptcy, or an assignee for benefit of creditors. (b) In order to secure the right provided by this section, the person or persons continuing the business or operations shall furnish the license or permit for for that business or operations for endorsement of such succession to the Chief, FELC, within 30 days from the date on which the successor begins to carry on the business or operations.

(Continued on reverse side)

Cut Here ✂

Federal Explosives License/Permit (FEL) Information Card

License/Permit Name: **UNCONVENTIONAL CONCEPTS INC**

Business Name:

License/Permit Number: **6-NY-031-20-3D-01206**

License/Permit Type: **20-MANUFACTURER OF EXPLOSIVES**

Expiration: **April 1,2023**

Please Note: Not Valid for the Sale or Other Disposition of Explosives.

Appendix J-2

U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

Federal Explosives License/Permit
(18 U.S.C. Chapter 40)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555), you may engage in the activity specified in this license or permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. **THIS LICENSE IS NOT TRANSFERABLE UNDER 27 CFR 555.53.** See "WARNINGS" and "NOTICES" on reverse.

Direct ATF Correspondence To	ATF - Chief, FELC 244 Needy Road Martinsburg, WV 25405-9431	License/Permit Number	**6-NY-031-33-3D-01207**
Chief, Federal Explosives Licensing Center (FELC)	Christopher R. Reeves	Expiration Date	**April 1,2023**

Name
UNCONVENTIONAL CONCEPTS INC

Premises Address (Changes? Notify the FELC at least 10 days before the move.)
87 HALE HILL LN
LEWIS, NY 12950-

Type of License or Permit
33-USER OF EXPLOSIVES

Purchasing Certification Statement

The licensee or permittee named above shall use a copy of this license or permit to assist a transferor of explosives to verify the identity and the licensed status of the licensee or permittee as provided by 27 CFR Part 555. The signature on each copy must be an original signature. A faxed, scanned or e-mailed copy of the license or permit with a signature intended to be an original signature is acceptable. The signature must be that of the Federal Explosives Licensee (FEL) or a responsible person of the FEL. I certify that this is a true copy of a license or permit issued to the licensee or permittee named above to engage in the business or operations specified above under "Type of License or Permit."

Mailing Address (Changes? Notify the FELC of any changes.)
UNCONVENTIONAL CONCEPTS INC
17 RACETRACK RD NW STE E
FORT WALTON BEACH, FL 32547-

Licensee/Permittee Responsible Person Signature _____ Position/Title _____

Printed Name _____ Date _____

Previous Edition is Obsolete UNCONVENTIONAL CONCEPTS INC 87 HALE HILL LN 12950 6-NY-031-33-3D-01207 April 1,2023 33-USER OF EXPLOSIVES

ATF Form 5400.14/5400.15 Part I
Revised October 2011

Federal Explosives License (FEL) Customer Service Information

Federal Explosives Licensing Center (FELC)
244 Needy Road
Martinsburg, WV 25405-9431

Toll-free Telephone Number: (877) 283-3352
Fax Number: (304) 616-4401
E-mail: FELC@atf.gov

ATF Homepage: www.atf.gov

Change of Address *(27 CFR 555.54(a)(1))*. Licensees or permittees may during the term of their current license or permit remove their business or operations to a new location at which they intend regularly to carry on such business or operations. The licensee or permittee is required to give notification of the new location of the business or operations not less than 10 days prior to such removal with the Chief, Federal Explosives Licensing Center. The license or permit will be valid for the remainder of the term of the original license or permit. **(The Chief, FELC, shall, if the licensee or permittee is not qualified, refer the request for amended license or permit to the Director of Industry Operations for denial in accordance with § 555.54.)**

Right of Succession *(27 CFR 555.59)*. (a) Certain persons other than the licensee or permittee may secure the right to carry on the same explosive materials business or operations at the same address shown on, and for the remainder of the term of, a current license or permit. Such persons are: (1) The surviving spouse or child, or executor, administrator, or other legal representative of a deceased licensee or permittee; and (2) A receiver or trustee in bankruptcy, or an assignee for benefit of creditors. (b) In order to secure the right provided by this section, the person or persons continuing the business or operations shall furnish the license or permit for for that business or operations for endorsement of such succession to the Chief, FELC, within 30 days from the date on which the successor begins to carry on the business or operations.

(Continued on reverse side)

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Federal Explosives License/Permit (FEL) Information Card

License/Permit Name: **UNCONVENTIONAL CONCEPTS INC**

Business Name:

License/Permit Number: **6-NY-031-33-3D-01207**

License/Permit Type: **33-USER OF EXPLOSIVES**

Expiration: **April 1,2023**

Please Note: Not Valid for the Sale or Other Disposition of Explosives.

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Appendix J-3

U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

Federal Firearms License
(18 U.S.C. Chapter 44)

In accordance with the provisions of Title I, Gun Control Act of 1968, and the regulations issued thereunder (27 CFR Part 478), you are licensed to engage in the business specified in this license, within the limitations of Chapter 44, Title 18, United States Code, and the regulations issued thereunder, until the expiration date shown. **THIS LICENSE IS NOT TRANSFERABLE UNDER 27 CFR 478.51.** See "WARNINGS" and "NOTICES" on reverse.

Direct ATF Correspondence To: ATF - Chief, FFLC
244 Needy Road
Martinsburg, WV 25405-9431

License Number: **6-14-031-10-3K-02530**

Chief, Federal Firearms Licensing Center (FFLC)
Tracey Robertson

Expiration Date: **October 1, 2023**

Name
UNCONVENTIONAL CONCEPTS INC

Premises Address (Changes? Notify the FFLC at least 30 days before the move.)
87 HALE HILL LANE
LEWIS, NY 12950-

Type of License
10-MANUFACTURER OF DESTRUCTIVE DEVICES

Purchasing Certification Statement

The licensee named above shall use a copy of this license to assist a transferor of firearms to verify the identity and the licensed status of the licensee as provided by 27 CFR Part 478. The signature on each copy must be an original signature. A faxed, scanned or e-mailed copy of the license with a signature intended to be an original signature is acceptable. The signature must be that of the Federal Firearms Licensee (FFL) or a responsible person of the FFL. I certify that this is a true copy of a license issued to the licensee named above to engage in the business specified above under "Type of License."

Mailing Address (Changes? Notify the FFLC of any changes.)

UNCONVENTIONAL CONCEPTS INC
17 RACETRACK RD NW STE E
FORT WALTON BEACH, FL 32547-

Licensee/Responsible Person Signature _____ Position/Title _____

Printed Name _____ Date _____

Previous Edition is Obsolete UNCONVENTIONAL CONCEPTS INC:87 HALE HILL LANE:12950:6-14-031-10-3K-02530:October 1, 2023:10-MANUFACTURER OF DESTRUCTIVE DEVICES

ATF Form 8 (5310.11)
Revised October 2011

Federal Firearms License (FFL) Customer Service Information

Federal Firearms Licensing Center (FFLC)
244 Needy Road
Martinsburg, WV 25405-9431

Toll-free Telephone Number: (866) 662-2750
Toll-free Fax Number: (866) 257-2749
E-mail: NLC@atf.gov

ATF Homepage: www.atf.gov
FFL eZ Check: www.atfonline.gov/fflezcheck

Change of Address *(27 CFR 478.52)*. Licensees may during the term of their current license remove their business or activity to a new location at which they intend regularly to carry on such business or activity by filing an Application for an Amended Federal Firearms License, ATF Form 5300.38, in duplicate, not less than 30 days prior to such removal with the Chief, Federal Firearms Licensing Center. The application must be executed under the penalties of perjury and penalties imposed by 18 U.S.C. 924. The application shall be accompanied by the licensee's original license. The license will be valid for the remainder of the term of the original license. **(The Chief, FFLC, shall, if the applicant is not qualified, refer the application for amended license to the Director of Industry Operations for denial in accordance with § 478.71.)**

Right of Succession *(27 CFR 478.56)*. (a) Certain persons other than the licensee may secure the right to carry on the same firearms or ammunition business at the same address shown on, and for the remainder of the term of, a current license. Such persons are: (1) The surviving spouse or child, or executor, administrator, or other legal representative of a deceased licensee; and (2) A receiver or trustee in bankruptcy, or an assignee for benefit of creditors. (b) In order to secure the right provided by this section, the person or persons continuing the business shall furnish the license for that business for endorsement of such succession to the Chief, FFLC, within 30 days from the date on which the successor begins to carry on the business.

(Continued on reverse side)

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Federal Firearms License (FFL) Information Card

License Name: **UNCONVENTIONAL CONCEPTS INC**

Business Name:

License Number: **6-14-031-10-3K-02530**

License Type: **10-MANUFACTURER OF DESTRUCTIVE DEVICES**

Expiration: **October 1, 2023**

Please Note: Not Valid for the Sale or Other Disposition of Firearms.

FFL Newsletter - Electronic Version Available

Sign-Up Today!

FFLs interested in receiving the electronic version of the FFL Newsletter, along with occasional additional information, should submit name, FFL number, and e-mail address to: FIPB@atf.gov.

The electronic FFL Newsletter will enable ATF to communicate information to licensees on a periodic basis.

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WARNINGS

1. The license is NOT a permit to carry a concealed weapon. Under 27 CFR 478.58 (State or Other Law), a license issued under this part confers no right or privilege to conduct business or activity contrary to State or other law. The holder of such a license is not by reason of the rights and privileges granted by that license immune from punishment for operating a firearm or ammunition business or activity in violation of the provisions of any State or other law. Similarly, compliance with the provisions of any State or other law affords no immunity under Federal law or regulations.

2. **This license is not transferable under 27 CFR 478.51.**

3. As provided in 18 U.S.C. § 922(g), it is unlawful for any person who has been convicted in any court of a crime punishable by imprisonment for a term exceeding one year; who is a fugitive from justice; who is an unlawful user of or addicted to any controlled substance (as defined in section 102 of the Controlled Substances Act (21 U.S.C. 802)); who has been adjudicated as a mental defective or who has been committed to a mental institution; who, being an alien, is illegally or unlawfully in the United States or, except as provided in subsection (y)(2), has been admitted to the United States under a nonimmigrant visa (as that term is defined in section 101(a)(26) of the Immigration and Nationality Act (8 U.S.C. 1101(a)(26))); who has been discharged from the Armed Forces under dishonorable conditions; who, having been a citizen of the United States, has renounced his citizenship; who is subject to a court order that (A) was issued after a hearing of which such person received actual notice, and at which such person had an opportunity to participate; (B) restrains such person from harassing, stalking, or threatening an intimate partner of such person or child of such intimate partner or person, or engaging in other conduct that would place an intimate partner in reasonable fear of bodily injury to the partner or child; and (C)(i) includes a finding that such a person represents a credible threat to the physical safety of such intimate partner or child; or (ii) by its terms explicitly prohibits the use, attempted use, or threatened use of physical force against such intimate partner or child that would reasonably be expected to cause bodily injury; or who has been convicted in any court of a misdemeanor crime of domestic violence, to ship or transport in interstate or foreign commerce, or possess in or affecting commerce, any firearm or ammunition; or to receive any firearm or ammunition which has been shipped or transported in interstate or foreign commerce. Except as provided in 18 U.S.C. § 925, such persons are prohibited from engaging in the business otherwise authorized by this license.

4. **Alteration or Changes to the License. Alterations or changes in the original license or in duplications thereof violates 18 U.S.C. 1001, an offense punishable by imprisonment for not more than 5 years and/or a fine of not more than $250,000.**

NOTICES

1. Any change in trade name or control of this business MUST be reported within 30 days of the change to the Chief, Federal Firearms Licensing Center (FFLC), 244 Needy Road, Martinsburg, WV 25405-9431. (27 CFR 478.53-478.54). A licensee who reports a Change of Control must, upon expiration of the license, file an ATF Form 7 as required by 27 CFR 478.44.

2. Under § 478.45, Renewal of License, if a licensee intends to continue the business or activity described on a license issued under this part during any portion of the ensuing year, the licensee shall, unless otherwise notified in writing by the Chief, FFLC, execute and file with ATF prior to the expiration of the license an application for a license renewal, ATF Form 8 Part II, in accordance with the instructions on the form, and the required fee. In the event the licensee does not timely file an ATF Form 8 Part II, the licensee must file an ATF Form 7 as required by § 478.44, and obtain the required license before continuing business. A renewal application will automatically be mailed by ATF to the "mailing address" on the license approximately 60 days prior to the expiration date of the license. If the application is not received 30 days prior to the expiration date, the licensee should contact the FFLC.

3. This license is conditional upon compliance by you with the Clean Water Act (33 U.S.C. 1341(a)).

4. THIS LICENSE MUST BE POSTED AND KEPT AVAILABLE FOR INSPECTION (27 CFR 478.91).

ATF Form 8 (5310.11)
Revised October 2011

Federal Firearms License (FFL) Customer Service Information

(Continued from front)

Discontinuance of Business *(27 CFR 478.127)*. Where a licensed business is discontinued and succeeded by a new licensee, the records prescribed by this subpart shall appropriately reflect such facts and shall be delivered to the successor, or may be, within 30 days following business discontinuance, delivered to the ATF Out-of-Business Records Center, 244 Needy Road, Martinsburg, WV 25405, or to any ATF office in the division in which the business was located. Where discontinuance of the business is absolute, the records shall be delivered within 30 days following the business discontinuance to the ATF Out-of-Business Records Center, 244 Needy Road, Martinsburg, WV 25405, or to any ATF office in the division in which the business was located.

FBI NICS - National Instant Criminal Background Check System (NICS) Information. If you live in a State where the FBI will do any of the required firearms sale, delivery, or transfer checks, you must be enrolled to access the FBI's NICS Operation Center. For additional FFL enrollment information 1-877-324-NICS.

FFL eZ Check

Bureau of Alcohol, Tobacco, Firearms and Explosives
https://www.atfonline.gov/fflezcheck

The purpose of this program is to allow an FFL or other user to verify that a Federal Firearms License (FFL) is valid. FFL eZ Check does not validate Type 03 (Collectors of Curios and Relics) and Type 06 (Manufacturer of Ammunition) licenses.

Toll-Free Number: 1-877-560-2435

✂ Cut Here

Federal Firearms Licensing Center (FFLC)
244 Needy Road
Martinsburg, WV 25405-9431

Toll-free number: (866) 662-2750
Fax number: (866) 257-2749
E-mail: NLC@atf.gov

FFL eZ Check
https://www.atfonline.gov/fflezcheck

ATF Hotline Numbers

Arson Hotline: 1-888-ATF-FIRE (1-888-283-3473)
Bomb Hotline: 1-888-ATF-BOMB (1-888-283-2662)
Report Illegal Firearms Activity: 1-800-ATF-GUNS (1-800-283-4867)
Firearms Theft Hotline: 1-888-930-9275
Report Stolen, Hijacked or Seized Cigarettes: 1-800-659-6242
Other Criminal Activity: 1-888-ATF-TIPS (1-888-283-8477)

STATE OF NEW YORK - DEPARTMENT OF LABOR
EXPLOSIVES LICENSE - DEALER MANUFACTURER

N.Y.S



MICHAEL HOPMEIER
UNCONVENTIONAL CONCEPTS INC

THIS CARD MUST BE CARRIED TO
PURCHASE, SELL, MANUFACTURE,
OWN, POSSESS OR TRANSPORT
EXPLOSIVES

LIC# D-5826
EXPIRES 09/21

101 101

NOT VALID IN NEW YORK CITY

Appendix J-4





DMV# 965131815

EYES HAZ

HAIR GRE

HGT 5' 09"

IF FOUND, RETURN TO:

NYSDOL - L&C UNIT

ROOM 161 BUILDING 12

STATE OFFICE CAMPUS

ALBANY NY 12240

102

102

Appendix J-5

State of New York
DEPARTMENT OF LABOR
DIVISION OF SAFETY AND HEALTH
INDUSTRY INSPECTION BUREAU
EXPLOSIVES MAGAZINE CERTIFICATE

2707

Explosive

MAILING ADDRESS OF INDIVIDUAL OR FIRM

Michael Hopmeier
17 Racetrack Road, NW
Suite E
Fort Walton Beach, FL 850243

MAGAZINE		
YEAR	COUNTY	EXPLOSIVES NUMBER
2020	15	04-595E
FEE PAID	DATE ISSUED	DATE EXPIRES
$100.00	9/30/2021	9/30/2022

MAGAZINE LOCATION

87 Hale Hill Lane
Lewis NY
Essex County

is granted permission to store explosives in the magazine cited above, in accordance with the Labor Law and Industrial Code Rules. The storage limit is based upon the physical capabilities of the magazine and the quantity and distance tables given in INDUSTRIAL CODE RULE 39. Any change in the conditions under which this certificate is granted may cause it to be revoked.

Note: This certificate is for storage only. If you intend to purchase, own, possess, or transport explosives, you MUST obtain and Explosive License.

BY: Charles Fanning
FOR THE COMMISSIONER OF LABOR

SCHEDULE OF FEES FOR MAGAZINE CERTIFICATE					
EXPLOSIVES				BLASTING CAPS OR DETONATORS	
$50.00	not more than 200 lbs.	$150.00	more than 20,000 lbs., but not more than 30,000 lbs.		
$100.00	more than 200 lbs., but not more than 10,000 lbs.	$200.00	more than 30,000 lbs., but not more than 300,000 lbs.	$50.00	Each Magazine
$125.00	more than 10,000 lbs., but not more than 20,000 lbs.		Smokeless	No Fee	Fee Exempt
No Fee	Farmer's Magazine - Valid for up to 200 lbs explosives		Municipality – Valid for explosives	No Fee	

POST THIS CERTIFICATE IN THE MAGAZINE – DETONATORS SHALL NOT BE STORED WITH OTHER EXPLOSIVES

Original

Post This Certificate in the Magazine - Detonators Shall Not Be Stored with Other Explosives

STATE OF NEW YORK	DEPARTMENT OF LABOR	
☑ **ALBANY** 12240 Gov. W. Averell Harriman State Office Building Campus	☐ **BINGHAMTON** 13901 44 Hawley Street	☐ **BUFFALO** 14202 65 Court Street
☐ **GARDEN CITY** 11530-6551 400 Oak Street	☐ **NEW YORK CITY** 75 Varick Street New York, NY 10013	☐ **ROCHESTER** 14607 109 So. Union Street
☐ **SYRACUSE** 13202 450 So. Salina Street	☐ **UTICA** 13501 207 Genesee Street	☐ **WHITE PLAINS** 10605 120 Bloomingdale Road

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APA Extension Letter

104

NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

December 21, 2021

Michael Hopmeier – via email

Dear Michael Hopmeier:

Re: APA Project P2021-0276

As discussed in our telephone conversation on December 21, 2021, the Agency's deadline for identifying and requesting additional information has been extended until January 13, 2022. Please sign below and return by fax (518-891-3938) or email to confirm your agreement to this deadline extension.

Thank you for your cooperation. If you have any questions, please do not hesitate to contact me, the Environmental Program Specialist assigned to APA Project 2021-0276.

Sincerely,

/s/Fritz Aldinger

Environmental Program Specialist

AGREEMENT TO EXTEND PROJECT TIME CLOCKS

As authorized representative for Project 2021-0276, I, hereby agree to extend the Agency's regulatory review time frames as described in this letter.

21 DEC 2021 _____

Date Michael Hopmeier

Cc: Project file: P2021-0276

2nd NIPA

106

SECOND NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	n/a

Date Permit Application Received: November 19, 2021
Type of Project: Commercial use shooting range
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Mr. Hopmeier:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on December 22, 2021. The submission provided important information in response to the Agency's December 6, 2021 Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's December 6, 2021 NIPA, the following questions must be addressed in order to review your application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

January 13, 2022
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. The provided response to the Agency's December 6, 2021 NIPA indicates the proposed lease area will be a portion of tax map parcel 38.1-1-31, and shows this lease area only as a red rectangle on an unscaled map. Please provide a scaled site plan prepared by a NYS licensed professional showing all of the following:
   - All waterbodies, including permanent and intermittent streams, and all natural swales and drainage features, within 200 feet of proposed development;
   - Boundaries of existing cover types (forested, clearing, etc.);
   - Topographic contours at 2-foot intervals within the leased parcel;
   - Existing and proposed access roadways, trails, and parking areas;
   - All property lines;
   - Proposed construction limits;
   - Safety signage;
   - Proposed control/operations area;
   - Proposed firing pad;
   - Proposed firing range; and
   - Proposed target area.

2. Please confirm the status and use of the road/trail that traverses the northwestern portion of the project site. Do other landowners hold easement or other rights to use this feature?

3. The provided response regarding alternate locations is inadequate. Please provide an explanation as to why the proposed munitions testing cannot be performed outside the Adirondack Park, e.g. at the Watervliet Arsenal, or at one of the Army's existing testing facilities or other existing facility with infrastructure already in place.

4. The provided noise assessment indicates that up to two noise events are to occur per day and are not expected to exceed 185 dBa at the source. However, the noise assessment uses a model with inputs including 183 dBa at the source. In addition, the noise assessment results indicate that an anticipated sound of 82 dBa at the nearest off-site residential receptor dwelling, which is the Pulsifer residence located 1.22 miles away, but provide no discussion with respect to ambient sound levels and characteristics at this receptor location or the sound pressure increase that represents a significant noise effect at this receptor location.

   Please provide a more complete noise assessment report. This report should include a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0 mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Rd and

State Land classified as Wild Forest. The revised assessment report should utilize a noise source of 185 dBa, not 183 dBa, to provide for a worst-case scenario condition, and should provide a detailed evaluation of the potential noise impacts to these receptors with respect to ambient sound pressure level.

5. The provided noise mitigation plan is only a public notification plan provided in narrative comparison to a blasting plan at a local mine with details to be included in the "site security and safety operations plan". Accordingly, please provide the site security and safety operations plan for Agency review. Please also provide a noise mitigation plan that includes sound pressure level reduction methods and accompanies the revised noise assessment report.

6. The provided narrative response states that the US Army Corps of Engineers (USACOE) range design guide is not applicable to a munitions testing range, and that a safety plan cannot be provided, but then states that the applicant will be working closely with the US Army Development Command, which will provide guidance and approval for the range design and operating procedures prior to allowing operations to occur. As such, to allow the Agency to provide for a coordinated review, please copy this Agency on the range design and operating procedures application to the US Army Development Command, and copy this Agency on any comments, approvals and/or correspondence received.

7. Please provide the Agency with a copy of all correspondence submitted to the New York State Department of Environmental Conservation (NYSDEC) regarding your proposal. Please also submit any response or other correspondence received from the NYSDEC. Please note that submission of an application to the NYSDEC or written confirmation from the NYSDEC documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

8. The "Explosive License- Dealer Manufacture" submitted to the Agency on December 22, 2021, expired in September 2021. Please provide confirmation from the New York State Police and United States Department of Justice (DOJ) that all approvals have been received for your proposal. Alternatively, please copy the Agency on an application to the State Police and DOJ for all necessary approvals. Please note that submission of application to the State Police and DOJ or written confirmation from these agencies documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

cc: Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

2nd NIPA Responses

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NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: February 11, 2022

SECOND NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	n/a

Date Permit Application Received: November 19, 2021
Type of Project: Commercial use shooting range
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Mr. Hopmeier:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on December 22, 2021. The submission provided important information in response to the Agency's December 6, 2021 Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's December 6, 2021 NIPA, the following questions must be addressed in order to review your application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

January 13, 2022
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

UCI's responses to APA's questions are in blue.

1. The provided response to the Agency's December 6, 2021 NIPA indicates the proposed lease area will be a portion of tax map parcel 38.1-1-31, and shows this lease area only as a red rectangle on an unscaled map. Please provide a scaled site plan prepared by a NYS licensed professional showing all of the following:
   - All waterbodies, including permanent and intermittent streams, and all natural swales and drainage features, within 200 feet of proposed development;
   - Boundaries of existing cover types (forested, clearing, etc.);
   - Topographic contours at 2-foot intervals within the leased parcel;
   - Existing and proposed access roadways, trails, and parking areas;
   - All property lines;
   - Proposed construction limits;
   - Safety signage;
   - Proposed control/operations area;
   - Proposed firing pad;
   - Proposed firing range; and
   - Proposed target area.

   UCI has retained an NYS-licensed professional, Mr. John Deming, to create a scaled site plan that includes the requested information. It is in progress, but is expected to take some time to complete due to extant weather conditions. We are submitting answers to your remaining questions at this time so that review of our responses may begin. We will forward the scaled site plan to the APA when it is complete.

2. Please confirm the status and use of the road/trail that traverses the northwestern portion of the project site. Do other landowners hold easement or other rights to use this feature?

   According to the landowner, no.

3. The provided response regarding alternate locations is inadequate. Please provide an explanation as to why the proposed munitions testing cannot be performed outside the Adirondack Park, e.g., at the Watervliet Arsenal, or at one of the Army's existing testing facilities or other existing facility with infrastructure already inplace.

   As has already been noted, we are not in a position to speak for the U.S. Army or its decision-making process. As we have already stated, the U.S. Army awarded a subcontract for us to

conduct this work based on a proposal we submitted to them, which included references to specific proprietary and unique technologies and capabilities. We have chosen to perform the work at the proposed location (which is within the confines of the Adirondack Park) because of its close proximity to our existing facility. Our existing facility has the resources and the capability to support such testing. However, we chose to relocate the actual testing to the opposite side of an existing natural obstacle in order to minimize the noise impacting the local community. It would be impractical to move the testing to a location farther from our existing facility, as doing so would not allow ready access to the secure storage and specialized instrumentation located at our facility. Thus, any attempt to relocate the testing to a significantly more distant area would be cost prohibitive, and more than likely the contract would not be able to be performed. Also, the local community would lose both the benefit of the technical and scientific infrastructure required to perform this highly technical and unique testing, and significant commercial and economic benefits. In addition, without this work being located locally, there would be no way to attract to the local community the type of highly qualified and trained personnel that have the potential to positively impact the community and its population. Thus, we chose to locate the testing in near proximity to our existing resources as a way to both minimize the impact on the environment and maximize the benefits to the community.

4. The provided noise assessment indicates that up to two noise events are to occur per day and are not expected to exceed 185 dBa at the source. However, the noise assessment uses a model with inputs including 183 dBa at the source. In addition, the noise assessment results indicate that an anticipated sound of 82 dBa at the nearest off-site residential receptor dwelling, which is the Pulsifer residence located 1.22 miles away, but provide no discussion with respect to ambient sound levels and characteristics at this receptor location or the sound pressure increase that represents a significant noise effect at this receptor location.

With regard to paragraph one of question 4, there will be no ambient noise. We see no need to provide any type of analysis with respect to ambient noise levels. The ambient noise should have no bearing on an assessment of noise propagation in the area. The only question and issue should be additional noise that may impact the Pulsifer residence. However, it should be noted that the Pulsifer residence is immediately adjacent to and nearly collocated with an existing medium industry operating facility; that facility regularly uses heavy machinery and creates constant noise levels associated with heavy equipment and wood processing (such as chain saws and ski loaders). In addition, a variety of firearms are periodically used in close proximity to the Pulsifer residence. Based on discussion with the residents of the Pulsifer residence, impulse noise levels equal to or less than standard hunting weapons, as noted in the prior submission, will not cause any problem or difficulty for the residents. Given the light to medium industrial environment in which this residence exists, the anticipated impulse noise will have little to no impact on the enjoyment or use of property in this nearby area. In addition, hunting is a common and frequent pastime in which impulse noise in excess of our anticipated roughly 85 dBa is a relatively frequent occurrence. If it is the APA's determination that the projected impulse noise levels from the test range are unacceptable, then we would request an explanation for why greater impulse noise levels associated with recreational use of firearms in the general area are allowed.

Please provide a more complete noise assessment report. This report should include a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0-mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Rd and State Land classified as Wild Forest. The

revised assessment report should utilize a noise source of 185 dBa, not 183 dBa, to provide for a worst-case scenario condition, and should provide a detailed evaluation of the potential noise impacts to these receptors with respect to ambient sound pressure level.

With respect to paragraph two of question 4, we have revised the numbers in the model to accurately reflect the impulse noise value of 185 dBa. The resulting sound map is included in this response package as Attachment A. Beyond the presentation of anticipated impulse noise values at receptors, and noting that this noise is well below other existing, as well as natural, sources (adjacent equipment, logging and light industrial, weather effects), no other detailed evaluation is possible. We have already provided comparative data for the anticipated noise levels, and are unclear as to what further evaluation may be required.

5. The provided noise mitigation plan is only a public notification plan provided in narrative comparison to a blasting plan at a local mine with details to be included in the "site security and safety operations plan". Accordingly, please provide the site security and safety operations plan for Agency review. Please also provide a noise mitigation plan that includes sound pressure level reduction methods and accompanies the revised noise assessment report.

In prior correspondence (20 DEC 2021), the APA indicated that it can provide no guarantee of protection for sensitive or proprietary information and recommended against providing it. For that reason, we will not provide either a site security plan or a safety operations plan as part of this submission, as those plans are considered both sensitive and proprietary. However, we will provide those plans to local law enforcement and to emergency management and response organizations. In addition, we will invite law enforcement and emergency response assets, along with operational staff, to attend our various firing events. Further, all of our tests will be coordinated with local emergency response and law enforcement organizations at least 24 hours prior to the test.

Methods for reducing sound pressure have already been discussed. Beyond the geographic placement of the test system and use of natural obstacles, no further mitigation efforts are planned.

6. The provided narrative response states that the US Army Corps of Engineers (USACOE) range design guide is not applicable to a munitions testing range, and that a safety plan cannot be provided, but then states that the applicant will be working closely with the US Army Development Command, which will provide guidance and approval for the range design and operating procedures prior to allowing operations to occur. As such, to allow the Agency to provide for a coordinated review, please copy this Agency on the range design and operating procedures application to the US Army Development Command, and copy this Agency on any comments, approvals and/or correspondence received.

The information requested in any interaction with the U.S. Army Development Command is considered both sensitive and proprietary. Further, it has no bearing on this application. Our operating procedures and methodologies, as well as any data collected and analyses performed,

are both proprietary to our company and sensitive in nature, as they relate to national security. The only relevant information should be the actual emissions created during tests. We are not requesting review or approval of our operating and data collection and analysis procedures from the APA, and the APA lacks the ability to effectively assess procedures and protocols for research and development and for test and evaluation. No coordination of our operating processes has been requested. Further, based on our understanding of APA procedures, coordination is not required.

7. Please provide the Agency with a copy of all correspondence submitted to the New York State Department of Environmental Conservation (NYSDEC) regarding your proposal. Please also submit any response or other correspondence received from the NYSDEC. Please note that submission of an application to the NYSDEC or written confirmation from the NYSDEC documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

We contacted NYSDEC as follows:

From: Irena Logan <ilogan@unconventional-inc.com>
Sent: Tuesday, December 7, 2021 10:36 AM
To: 'contact@dec.ny.gov' <contact@dec.ny.gov>
Subject: The request for the appropriate point of contact regarding our proposal.

Dear Ladies and Gentlemen:

UCI has submitted an application to the Adirondack Park Agency regarding a proposed construction project, summary follows:

APA application number 2021-0276.
Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – shooting range
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

The APA, in response to UCI's application, directed us to contact you regarding our proposal, to copy that point of contact on all correspondence, and to provide the APA with any comments and other responses we receive from you.

Our question is: who is the appropriate point of contact within your organization? Please send us their contact information (email and phone) so that we might contact them directly.

Thank you so much!

v/r
Irena Logan
UCI Research Assistant

We received the following response:

> From: contact@dec.ny.gov <contact@dec.ny.gov>
> Sent: Tuesday, December 7, 2021 10:36 AM
> To: Irena Logan <ilogan@unconventional-inc.com>
> Subject: Automatic reply: The request for the appropriate point of contact regarding our proposal.
>
> Thank you for contacting the New York State Department of Environmental Conservation. We attempt to reply to all emails within a few days. If you have an emergency, you can find additional contact information, including phone numbers, on our website Contact Us page: http://www.dec.ny.gov/about/259.html.

8. The "Explosive License- Dealer Manufacture" submitted to the Agency on December 22, 2021, expired in September 2021. Please provide confirmation from the New York State Police and United States Department of Justice (DOJ) that all approvals have been received for your proposal. Alternatively, please copy the Agency on an application to the State Police and DOJ for all necessary approvals. Please note that submission of application to the State Police and DOJ or written confirmation from these agencies documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

We have provided a copy of our current license as Attachment B of this response package. We apologize for this oversight.

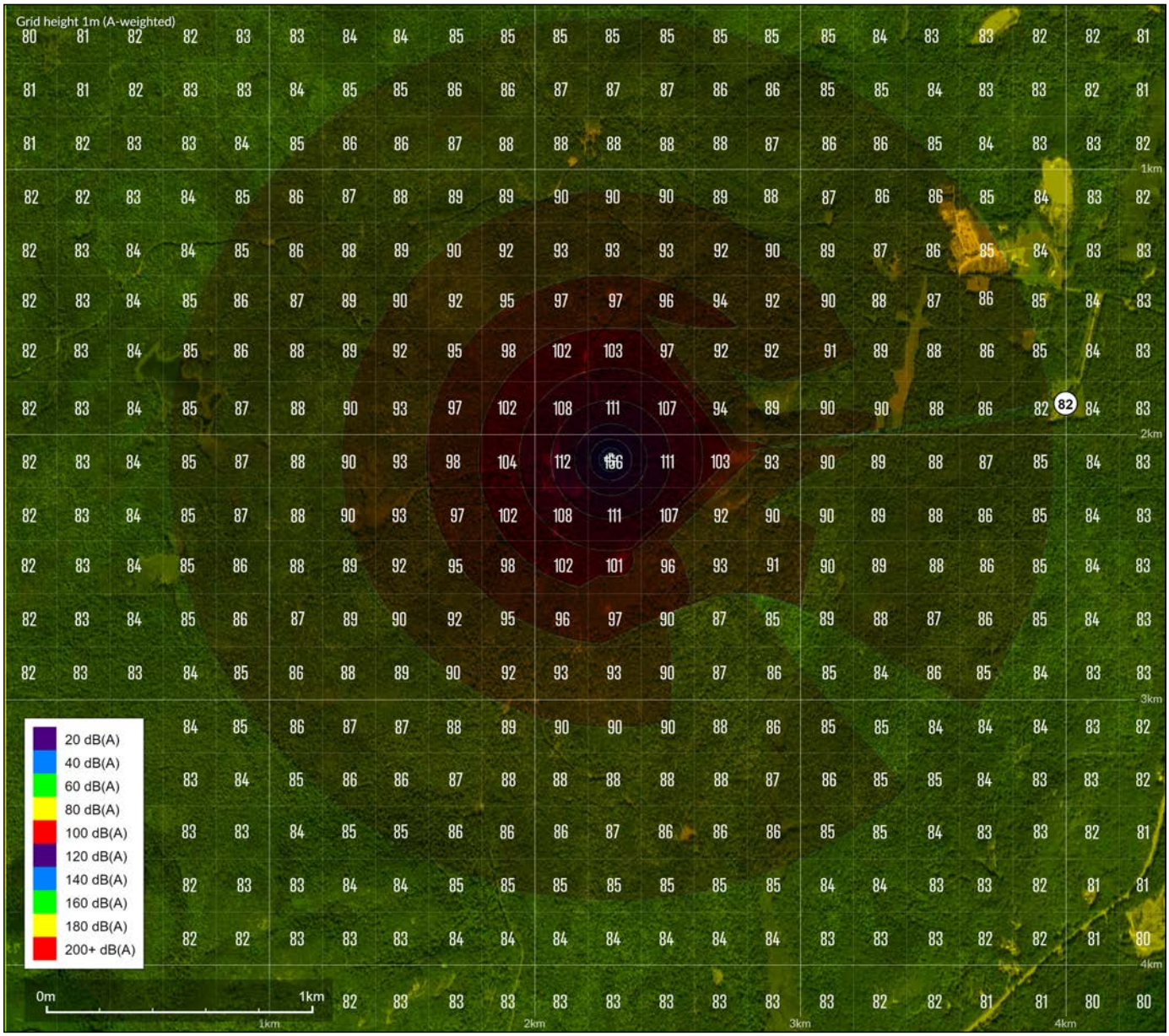
With regard to the DOJ and the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), we are unaware of any requirement that they must approve or review our proposal. Please provide specific approval requirements from your agency that directly relate to the DOJ and the ATF. The requirement to prove a negative, i.e., to have an agency of the federal government give a statement that they have no authority or requirement, is both impractical and unreasonable. If the APA can provide specific requirements and documentation for necessary approvals, they will be reviewed and appropriate actions will be taken.

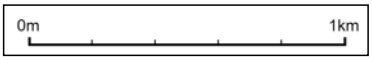
dBmap.net - Noise Mapping Results

Report

1/14/2022

Noise Map - Grid height 1m (A-weighted)





Model Overview



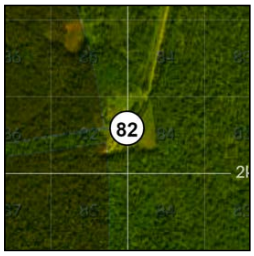
Receiver Results - Summary

Receiver Name	Height (m)	Overall Level dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Receiver	1	82			82						

Sources

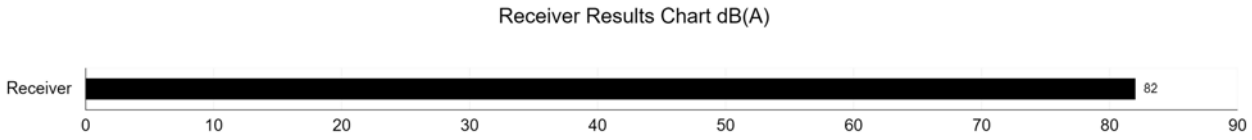
Source Name	Height (m)	Overall Level dB	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Point	1	185			185						

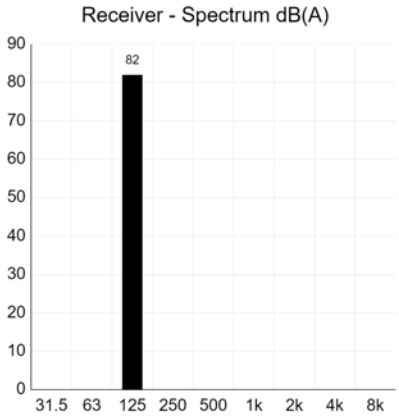
Receiver Locations



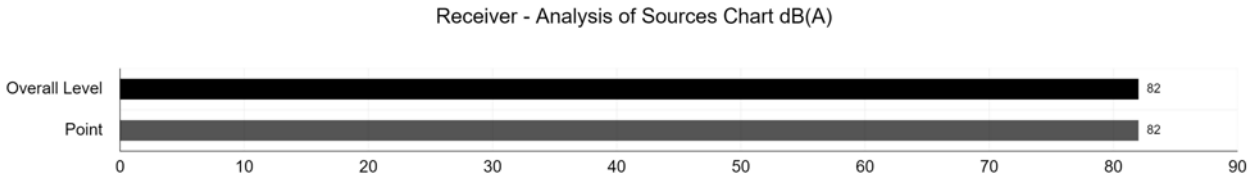
Receiver

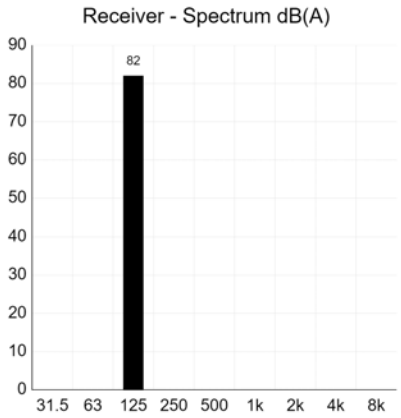
Receiver Charts





Receiver


Receiver - Analysis of Sources Chart dB(A)
Overall Level
Point
82
82
0
10
20
30
40
50
60
70
80
90


Receiver - Spectrum dB(A)
90
80
70
60
50
40
30
20
10
0
82
31.5
63
125
250
500
1k
2k
4k
8k


Location
82

Configuration

Heights for all calculation results are relative to ground level
0.8G Ground Factor
15°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included using convex paths only (following ISO17534-3 recommendation 5.2)
Ground reflections are not screened (as recommended in ISO17534-3 5.3)

References

ISO 9613-1:1993 — Attenuation of sound during propagation outdoors — Part 1: Calculation of the absorption of sound by the atmosphere
ISO 9613-2:1996 — Attenuation of sound during propagation outdoors — Part 2: General method of calculation
ISO/TR 17534-3:2015 — Acoustics — Software for the calculation of sound outdoors — Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1. Quality Assurance and Test Cases: https://dbmap.net/iso17534results

STATE OF NEW YORK - DEPARTMENT OF LABOR
EXPLOSIVES LICENSE - DEALER MANUFACTURER

N.Y.S



MICHAEL HOPMEIER
UNCONVENTIONAL CONCEPTS INC

THIS CARD MUST BE CARRIED TO
PURCHASE, SELL, MANUFACTURE,
OWN, POSSESS OR TRANSPORT
EXPLOSIVES

LIC# D-5826
EXPIRES 12/22

125

125

Attachment B NOT VALID IN NEW YORK CITY





01213 006069506 14

DMV# 965131815

EYES HAZ

HAIR GRE

HGT 5' 09"

IF FOUND, RETURN TO:

NYSDOL - L&C UNIT

ROOM 161 BUILDING 12

STATE OFFICE CAMPUS

ALBANY NY 12240

126

126

APA EPS

Letter 1

March 1, 2022

Michael Hopmeier
620 Herndon Parkway, Suite 120A
Herndon, VA 20170

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Michael Hopmeier:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received on February 11, 2022. The submission provided important information in response to the Agency's January 13, 2022 Notice of Incomplete Permit Application (NIPA). As a result, items 2, 3, and 7 of the January 13, 2022 NIPA are either satisfied or no longer required.

As discussed during the February 25, 2022 WebEx meeting, the remaining information required by the Agency's January 13, 2022 NIPA is still required to review the application. A copy is enclosed for your convenience. You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

If you have any questions regarding this letter or the project review process, please contact me at (518) 304-6149.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

Attachment: January 13, 2022 NIPA

APA Extension Letter 2

129

NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency

RECEIVED

Date: May 12, 2022

May 6, 2022

Michael Hopmeier – via email

Dear Mr. Hopmeier:

Re: APA Project P2021-0276

As discussed in our telephone conversation on May 6, 2022, the Agency's deadline for reviewing your submission and identifying and requesting additional information has been extended from 15 days to 25 days after the submission. Please sign below and return with your submission or email to confirm your agreement to this deadline extension.

Thank you for your cooperation. If you have any questions, please do not hesitate to contact me, Fritz Aldinger, the Environmental Program Specialist assigned to APA Project P2021-0276.

Sincerely,

/s/Fritz Aldinger

Environmental Program Specialist

AGREEMENT TO EXTEND PROJECT TIME CLOCKS

As applicant for Project P2021-0276, I, Michael Hopmeier, hereby agree to extend the Agency's regulatory review time frames as described in this letter.

5 May 2022 _____

Date

Michael Hopmeier

UCI Response to EPS Letter 1 (3/1/2022)

131

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: May 12, 2022

March 1, 2022

Michael Hopmeier
620 Herndon Parkway, Suite 120A
Herndon, VA 20170

Re: APA Project 2021-0276
Town of Lewis, Essex County
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If you have any questions regarding this letter or the project review process, please contact me at (518) 304-6149.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)
Attachment: January 13, 2022 NIPA

Addendum to UCI's responses to the 2nd NIPA received in response to APA Project No. 2021-0276

UCI's responses to the APA's questions are in blue text.

1. The provided response to the Agency's December 6, 2021 NIPA indicates the proposed lease area will be a portion of tax map parcel 38.1-1-31, and shows this lease area only as a red rectangle on an unscaled map. Please provide a scaled site plan prepared by a NYS licensed professional showing all of the following:
    - All waterbodies, including permanent and intermittent streams, and all natural swales and drainage features, within 200 feet of proposed development;
        - None
    - Boundaries of existing cover types (forested, clearing, etc.);
        - See scaled site plan, Appendix C
    - Topographic contours at 2-foot intervals within the leased parcel;
        - See scaled site plan
    - Existing and proposed access roadways, trails, and parking areas;
        - Roadways and trails are marked on the scaled site plan; parking will be along the side of the access road
    - All property lines;
        - See scaled site plan
    - Proposed construction limits;
        - NA; no construction is proposed
    - Safety signage;
        - See site diagram, image 2, provided in Appendix F of the package UCI submitted to APA on Dec. 21, 2021
    - Proposed control/operations area;
        - See scaled site plan
    - Proposed firing pad;
        - See scaled site plan
    - Proposed firing range; and
        - See scaled site plan
    - Proposed target area.
        - See scaled site plan

    Addendum to UCI's Feb. 11 response: UCI retained an NYS-licensed professional, Mr. John Deming, to create a scaled site plan that includes the requested information. A scaled plan of the proposed test range site is provided in Appendix C of this addendum response package. The items above are annotated on the scaled site plan provided, with the proviso that they will be relocated within the boundaries of the test site as needed to support operations. Any relocation will be done in a way that minimizes any external effects, and in accordance with SOP.

2. Please confirm the status and use of the road/trail that traverses the northwestern portion of the project site. Do other landowners hold easement or other rights to use this feature?

    According to correspondence from the APA on March 1, 2022, this item is either satisfied or is no longer required.

3. The provided response regarding alternate locations is inadequate. Please provide an explanation as to why the proposed munitions testing cannot be performed outside the Adirondack Park, e.g., at the Watervliet Arsenal, or at one of the Army's existing testing facilities or other existing facility with infrastructure already inplace.

According to correspondence from the APA on March 1, 2022, this item is either satisfied or is no longer required.

4. The provided noise assessment indicates that up to two noise events are to occur per day and are not expected to exceed 185 dBa at the source. However, the noise assessment uses a model with inputs including 183 dBa at the source. In addition, the noise assessment results indicate that an anticipated sound of 82 dBa at the nearest off-site residential receptor dwelling, which is the Pulsifer residence located 1.22 miles away, but provide no discussion with respect to ambient sound levels and characteristics at this receptor location or the sound pressure increase that represents a significant noise effect at this receptor location.

Addendum to UCI's Feb. 11 response: Based on recommendation from the APA, further research on the noise source was performed. Based on that research, the actual noise source is assumed to be 166.1 dB[1].

Based on current site usage (medium industrial, with heavy diesel truck traffic supporting a sawmill), the ambient noise level is assumed to be approximately 80 dB at the nearest residence (the Pulsifer home), which is adjacent to a saw mill and a diesel truck refueling site. This value is derived from current site usage including heavy construction equipment and periodic large diesel-powered vehicles providing refueling and agricultural operations. This noise is periodic, frequent, and generally long in duration compared to the impulse noise to be generated via firing range operations. Based on further discussion with APA personnel via WebEx on Feb. 25, 2022, we have modified our response to this question. UCI's noise assessment is available in Appendix D of this addendum response package.

Please provide a more complete noise assessment report. This report should include a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0-mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Rd and State Land classified as Wild Forest. The revised assessment report should utilize a noise source of 185 dBa, not 183 dBa, to provide for a worst-case scenario condition, and should provide a detailed evaluation of the potential noise impacts to these receptors with respect to ambient sound pressure level.

Addendum to UCI's Feb. 11 response: Based on recommendation from the APA, further research on the noise source was performed. Based on that research, the actual noise source is assumed to be 166.1 dB[2]. UCI's updated noise assessment is available in Appendix D of this addendum response package.

[1] US Army Center for Health Promotion and Preventive Medicine, Hearing Conservation Program, Noise Levels of Common Army Equipment, https://www.nrc.gov/docs/ML0701/ML070120304.pdf.
[2] US Army Center for Health Promotion and Preventive Medicine, Hearing Conservation Program, Noise Levels of Common Army Equipment, https://www.nrc.gov/docs/ML0701/ML070120304.pdf.

5. The provided noise mitigation plan is only a public notification plan provided in narrative comparison to a blasting plan at a local mine with details to be included in the "site security and safety operations plan". Accordingly, please provide the site security and safety operations plan for Agency review. Please also provide a noise mitigation plan that includes sound pressure level reduction methods and accompanies the revised noise assessment report.

Addendum to UCI's Feb. 11 response: Per agreement with APA personnel during a WebEx discussion on Feb. 25, 2022, UCI will be providing only the annexes to the safety and security plan and the operation plan that deal with noise mitigation, control, and external effects. The site security and safety plan contains sensitive and propriety information and will not be released. However, the Sound Mitigation and Control Annex of the Security and Safety Plan is non-sensitive and does not contain propriety information. A copy of this annex is provided below.

The test site was chosen for a number of reasons. First, it is remote and is in near proximity to 87 Hale Hill Lane, Lewis, NY, the primary facility responsible for providing administrative and logistical support for testing. Second, the selected location also provides access control, takes advantage of land that has been previously cleared, and has pre-existing road access. Finally, this site's location, topography, and natural vegetation facilitate natural noise abatement, thus reducing potential anxiety and tension that might be experienced by the surrounding community as a result of any loud noises generated at the site. UCI conducted a point-by-point consideration of NYSDEC's Assessing and Mitigating Noise Impacts[3]; the result is included in Appendix D of this application package. The noise assessment and the Sound Mitigation and Control Annex of the Safety and Security plan discuss this information in detail.

In addition, UCI has retained the services of Robert Dillon, Ph.D., PE, former director of US Army Benét Laboratories (responsible for the design and assessment of large caliber weapons for the US Army) and a world-renowned expert in the assessment, test, and evaluation of large cannons (Dr. Dillon's CV is provided in Appendix E). Dr. Dillon will review UCI's operating and noise mitigation procedures, and will provide on-going assistance and guidance on ways to minimize our impact on the surrounding community.

Safety and Security Plan, Sound Mitigation and Control Annex

Scenario

The test platform will emit noise from a single point: the system under test. The maximum noise intensity emitted by the system under test is 166.1 dB[4]. The duration of each generated impulse noise will be approximately 4 milliseconds. The sound of the projectile impacting the end of the range will be mitigated using a soft catch system; thus, there will effectively be one single impulse noise event per shot fired.

Protection Measures for Test Range Personnel

The test director has the overall responsibility for safety and adherence to the guidelines established in this sound mitigation and control annex; these guidelines ensure that:

- Hearing loss for those exposed to acute noise levels is prevented, and that

[3] NYS Department of Environmental Conservation, Assessing and Mitigating Noise Impacts, 2000, https://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf.

[4] US Army Center for Health Promotion and Preventive Medicine, Hearing Conservation Program, Noise Levels of Common Army Equipment, https://www.nrc.gov/docs/ML0701/ML070120304.pdf.

- Noise-induced anxiety and/or stress to the local community is mitigated.

The test director can delegate these tasks to the range safety officer and the public relations coordinator.

The range safety officer will comply with DOD Instruction 6055.12, Hearing Conservation Program (HCP) section 3.6[5], and will ensure that all test personnel and observers within close proximity (200 meters / 656.17 ft) of the noise emitter wear appropriate hearing protection. Appropriate signage will be posted around the test site stating that the site is a hazardous area and to "Stay Clear". The range safety officer will also ensure the range is clear of all unauthorized persons prior to any testing. Prior to each shot, they will initiate an announcement on a PA system that the range is hot, activate an orange strobe light, and perform a 10-second count-down to shot initiation. They will also inform the public affairs coordinator of the test schedule no later than 10 days prior to any testing; the schedule will include the approximate times and the duration of testing.

Noise Mitigation Measures

In addition to ensuring the safety of personnel involved in testing, UCI would like to minimize the disruption that operations at the proposed test range will cause for nearby residents and businesses. Sound may be mitigated via naturally occurring methods and methods that require human action; the most successful mitigation strategies use both types. Thus, UCI will use a combination of naturally occurring and active methods for sound mitigation at the proposed test site.

Some active noise mitigation measures include limiting the number of incidents of noise generated, limiting the hours of operation of noise-generating equipment, and announcing the occurrence of test events well in advance of conducting any testing. UCI will implement all of these measures, as follows.

- Systems under test will be limited to firing two shots per day; with an anticipated maximum of 10 shots fired per month.
- The hours of operation at the test range will be limited to between 10:00 AM and 4:00 PM local time, and the site will not operate during weekends or holidays.
- No later than 10 days prior to any testing, the range safety officer will provide the public affairs coordinator with a schedule of the upcoming testing; the schedule will include the approximate times and the duration of testing. Seven days prior to any testing, the public affairs coordinator will contact the Town Supervisor and provide them with the testing schedule. Emergency Management Services will also be notified in case they receive any 911 calls reporting loud noises. The Town Supervisor will coordinate with local Emergency Management Services to notify any citizens in close proximity to the test rage of the test schedule, by phone or email, 72 prior to testing and again 24 hours prior to testing.

Due to the infrequency of test shots, long-term exposure to dissipated noise levels is not expected to cause any hearing damage or increases in anxiety or stress in nearby residents.

Naturally Occurring Noise Mitigation Measures

In addition to the measures taken by on-site personnel for hearing protection and noise mitigation, the following are naturally occurring characteristics of the site proposed for the test

[5] US Department of Defense, DOD Instruction 6055.12, Hearing Conservation Program (HCP), August 14, 2019, p11-13. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/605512p.pdf.

range, and are an important reason why UCI selected that particular site for the proposed test range.

Distance: Distance is a large factor in the location of the testing range, and the closest non-participant to the site of the proposed test range is the Pulsifer residence and adjacent sawmill, which is 0.96 miles east.

Vegetation: Additional natural mitigation measures that are in place include the natural vegetation and the local topography of the proposed test site. The site is surrounded by dense vegetation that includes deciduous and coniferous trees, bushes, and grasses. A report on the composition of the forest surrounding the test site includes information on the various tree species growing there; a copy is provided in Appendix D, Figure 3 of this application package. Many of the trees nearby are red oaks; hard maple species and white pine are also numerous. The stand is of uneven age and height; the heterogeneity in age and height creates a better sound barrier, as there are fewer gaps in the vegetation. Cook and Van Haverbeke (1971)[6] found that belts of trees between 15 and 30 m wide (49.2 – 98.4 ft) reduced noise levels by 5-10 dB; their research also suggests that natural vegetation of tall (approximately 30 meters in height) dense trees combined with soft ground surfaces can reduce apparent loudness by at least 50%. (The US Department of Agriculture notes that the reduction is 5-8 dB for a belt of trees of a similar width and 30 ft in height[7]). Thus, the on-site vegetation helps create an effective noise buffer that decreases the sound that propagates to surrounding areas, providing natural mitigation. Based on this information, and assuming a 120-meter (393.7 ft) perimeter around the site (120 m is the distance between the firing pad and the base of the mountain slope), we anticipate significant noise attenuation, thereby providing mitigation, of 20 dB[8].

Topography: The testing range will be located between Big Church Mountain and Little Church Mountain. The rock structure of the mountains will create an amphitheater effect; noise generated west of the mountains (the location of the proposed testing range) will be reflected back to the west, away from the residences and populations in the surrounding areas.

A copy of the site survey of the testing range is provided in Appendix C of this application package. The survey revealed that the site proposed for the test range is concave in shape; when looking from west to east across the site, the survey notes that elevation decreases from 1380 ft to 1350 ft, then increases again to an elevation of 1382 ft. Due to the concave shape of the proposed site, there is no straight line that sound can travel to any persons or habitations in the surrounding area; this lack of line of sight aids in corralling sound emitted at the test site and reducing noise propagation to surrounding locations.

Summary: Based on a noise assessment that included the factors of distance, local vegetation, and topography, the noise intensity at the closest non-participant location to the site of the proposed test range (Pulsifer residence and sawmill) will be reduced to 66 dB(A).

[6] Cook, David I. and Haverbeke, David F., "Trees and Shrubs for Noise Abatement" (1971). Historical Research Bulletins of the Nebraska Agricultural Experiment Station (1913-1993). 269. http://digitalcommons.unl.edu/ardhistrb/269.

[7] US Department of Agriculture National Agroforestry Center, Conservation Buffers: Buffers for Noise Control, https://www.fs.usda.gov/nac/buffers/guidelines/6_aesthetics/4.html.

[8] The slope of Big Church Mountain begins 120 m (393.7 ft) from the firing pad of the proposed test range. A buffer width of 120m ft, at 5 dB reduction per 30 m ft of buffer, would provide a noise dampening effect of (120/30 × 5 dB) 20 dB.

6. The provided narrative response states that the US Army Corps of Engineers (USACOE) range design guide is not applicable to a munitions testing range, and that a safety plan cannot be provided, but then states that the applicant will be working closely with the US Army Development Command, which will provide guidance and approval for the range design and operating procedures prior to allowing operations to occur. As such, to allow the Agency to provide for a coordinated review, please copy this Agency on the range design and operating procedures application to the US Army Development Command, and copy this Agency on any comments, approvals and/or correspondence received.

Addendum to UCI's Feb. 11 response: As noted previously, and discussed with APA personnel on Feb. 25, 2022, UCI will provide relevant information to the APA, but no coordinated review is required or possible due to the sensitive and proprietary nature of information and correspondence between UCI and its Army sponsors.

7. Please provide the Agency with a copy of all correspondence submitted to the New York State Department of Environmental Conservation (NYSDEC) regarding your proposal. Please also submit any response or other correspondence received from the NYSDEC. Please note that submission of an application to the NYSDEC or written confirmation from the NYSDEC documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

According to correspondence from the APA on March 1, 2022, this item is either satisfied or is no longer required.

8. The "Explosive License- Dealer Manufacture" submitted to the Agency on December 22, 2021, expired in September 2021. Please provide confirmation from the New York State Police and United States Department of Justice (DOJ) that all approvals have been received for your proposal. Alternatively, please copy the Agency on an application to the State Police and DOJ for all necessary approvals. Please note that submission of application to the State Police and DOJ or written confirmation from these agencies documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

Addendum to UCI's Feb. 11 response: UCI is unaware of any application procedure required by either the State Police or DOJ for support of our request, and to the best of its knowledge has complied with all regulatory requirements. The licensing that has been provided already (FEL, FFL, and NYSEL) is all that UCI is aware of that is required from a regulatory point of view.

Appendix C: Site Survey

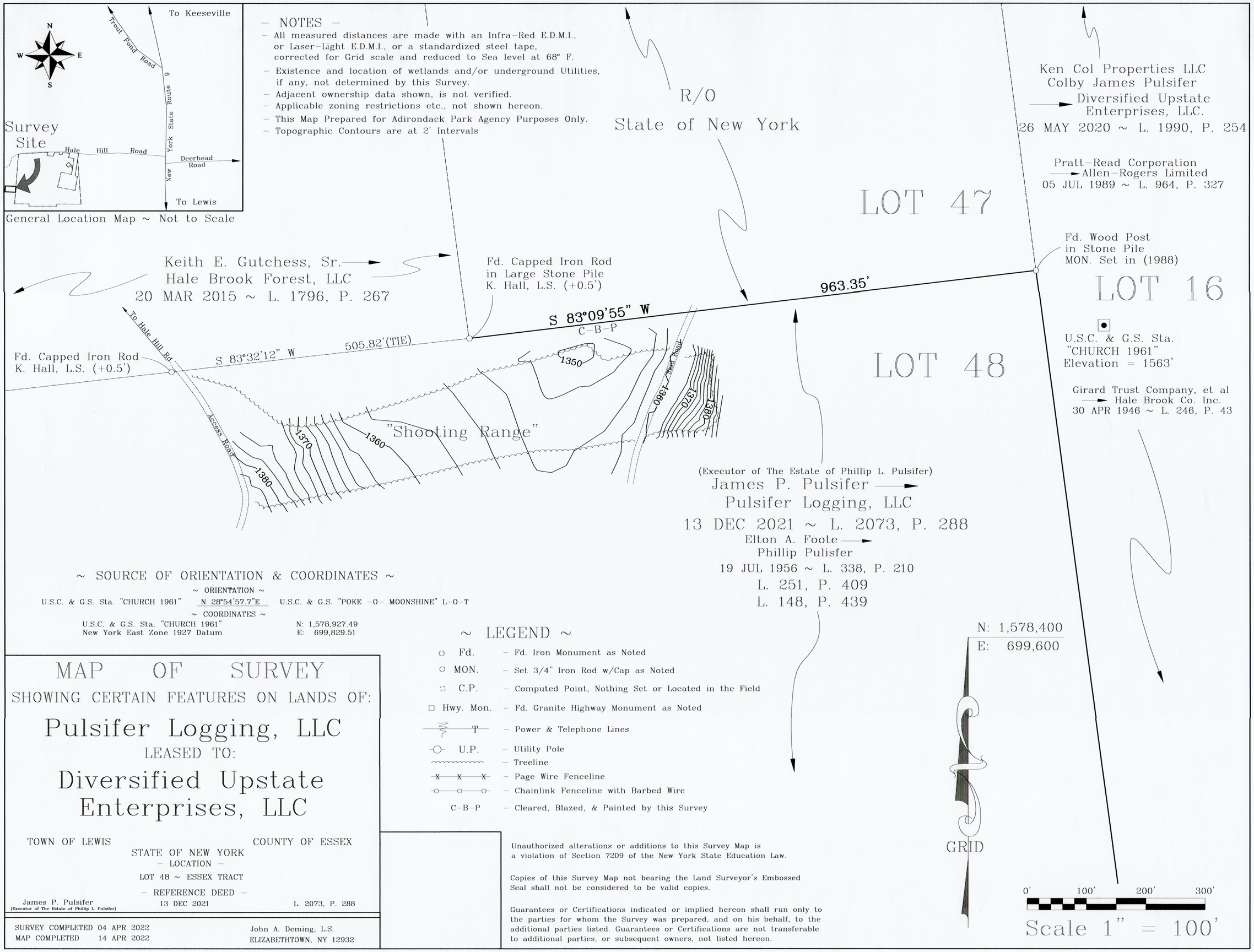
The image below is a scanned copy of the original site survey, the original site survey is available upon request.

139

General Location Map ~ Not to Scale

– NOTES –

- All measured distances are made with an Infra-Red E.D.M.I., or Laser-Light E.D.M.I., or a standardized steel tape, corrected for Grid scale and reduced to Sea level at 68° F.
- Existence and location of wetlands and/or underground Utilities, if any, not determined by this Survey.
- Adjacent ownership data shown, is not verified.
- Applicable zoning restrictions etc., not shown hereon.
- This Map Prepared for Adirondack Park Agency Purposes Only.
- Topographic Contours are at 2' Intervals



~ SOURCE OF ORIENTATION & COORDINATES ~

~ ORIENTATION ~

U.S.C. & G.S. Sta. "CHURCH 1961" N 28°54'57.7"E U.S.C. & G.S. "POKE -O- MOONSHINE" L-O-T

~ COORDINATES ~

U.S.C. & G.S. Sta. "CHURCH 1961" N: 1,578,927.49
New York East Zone 1927 Datum E: 699,829.51

~ LEGEND ~

○ Fd.	– Fd. Iron Monument as Noted
○ MON.	– Set 3/4" Iron Rod w/Cap as Noted
◌ C.P.	– Computed Point, Nothing Set or Located in the Field
□ Hwy. Mon.	– Fd. Granite Highway Monument as Noted
T	– Power & Telephone Lines
U.P.	– Utility Pole
	– Treeline
X X X	– Page Wire Fenceline
	– Chainlink Fenceline with Barbed Wire
C-B-P	– Cleared, Blazed, & Painted by this Survey

MAP OF SURVEY

SHOWING CERTAIN FEATURES ON LANDS OF:

Pulsifer Logging, LLC

LEASED TO:

Diversified Upstate Enterprises, LLC

TOWN OF LEWIS COUNTY OF ESSEX

STATE OF NEW YORK

– LOCATION –

LOT 48 ~ ESSEX TRACT

– REFERENCE DEED –

James P. Pulsifer (Executor of The Estate of Phillip L. Pulsifer) 13 DEC 2021 L. 2073, P. 288

SURVEY COMPLETED 04 APR 2022
MAP COMPLETED 14 APR 2022

John A. Deming, L.S.
ELIZABETHTOWN, NY 12932

Unauthorized alterations or additions to this Survey Map is a violation of Section 7209 of the New York State Education Law.

Copies of this Survey Map not bearing the Land Surveyor's Embossed Seal shall not be considered to be valid copies.

Guarantees or Certifications indicated or implied hereon shall run only to the parties for whom the Survey was prepared, and on his behalf, to the additional parties listed. Guarantees or Certifications are not transferable to additional parties, or subsequent owners, not listed hereon.

EX-L-22-01

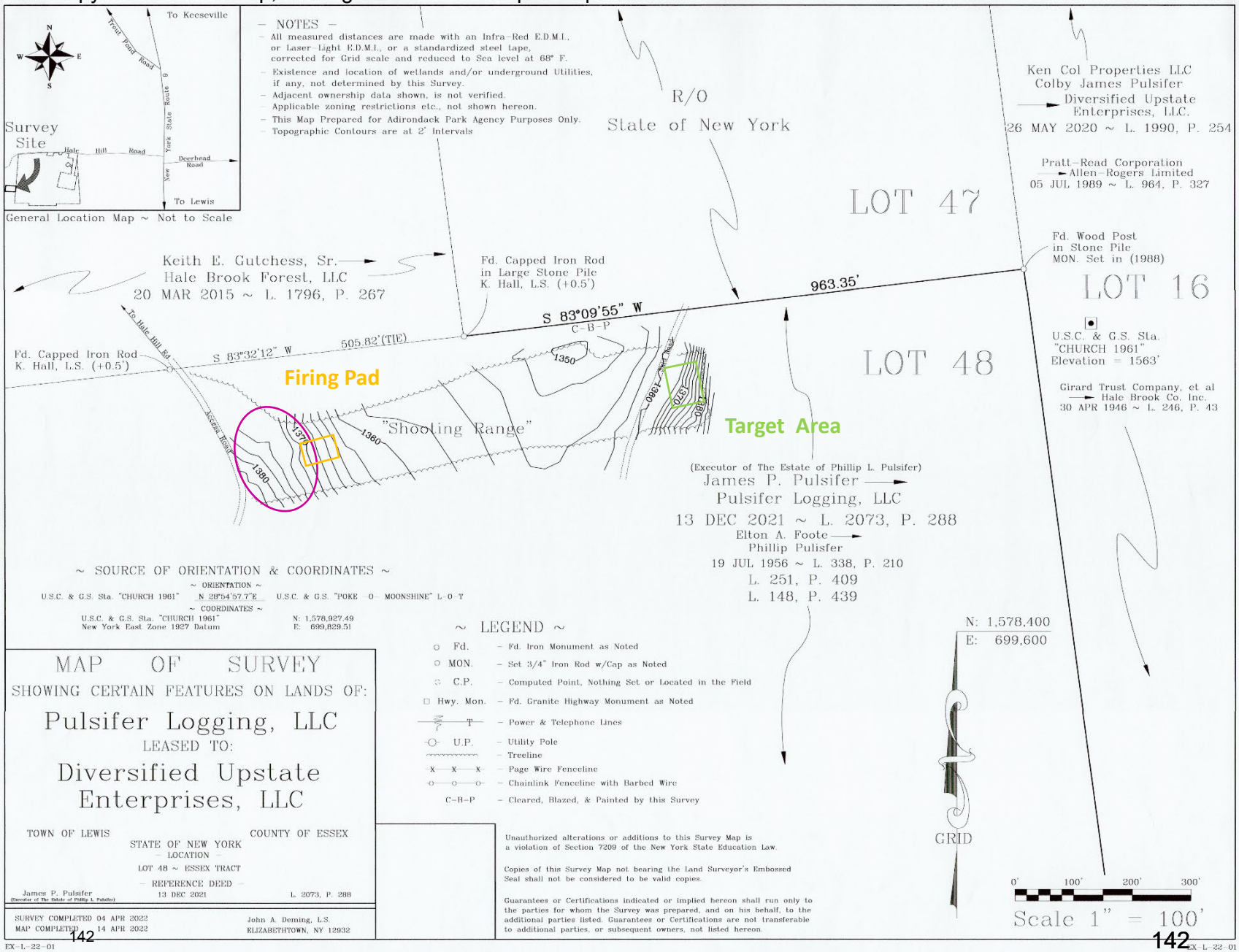
EX-L-22-01

140

Site survey: edited copy (next page)

141

Edited copy of a certified map; the original is available upon request.



142
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Appendix D: Noise Assessment

UCI's point by point consideration of

the New York State Department of Environmental Conservation Program Policy:

Assessing and Mitigating Noise Impacts[9]

[9] NYS Department of Environmental Conservation, Assessing and Mitigating Noise Impacts, https://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf

ASSESSING AND MITIGATIG NOISE IMPACTS: INTRODUCTION

The Adirondack Park Agency directs applicants to perform a noise assessment of proposed projects, per the guidelines provided in the New York State Department of Environmental Conservation Program Policy "Assessing and Mitigating Noise Impacts"[10]. The procedure for performing this assessment is provided in Section V of the program policy. Below is UCI's response to each point raised in that section. Policy text and questions are black; UCI's response is provided in blue.

PROCEDURE

A. ENVIRONMENTAL SETTING AND EFFECTS ON NOISE LEVELS

1. Noise reduction over distance

Distance is a large factor in the location of the testing range, and is considered in the context of the closest location that is not involved in the operation being 0.96 miles due east of the proposed testing range.

The impulse noise level at the testing range is anticipated to be 166.1 dB[11]. The noise will be reduced to 66 dB(A) or less at the closest nonparticipant location: the Pulsifer residence (which is adjacent to a sawmill; shown on the map in Figure 1).

Noise Source	Noise Level (dB)
M109A5/6; Paladin, 155mm self-propelled Howitzer firing M4A2 zone 7 charges	166.1

[10] NYS Department of Environmental Conservation, Assessing and Mitigating Noise Impacts, https://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf

[11] US Army Center for Health Promotion and Preventive Medicine, Hearing Conservation Program, Noise Levels of Common Army Equipment, https://www.nrc.gov/docs/ML0701/ML070120304.pdf.

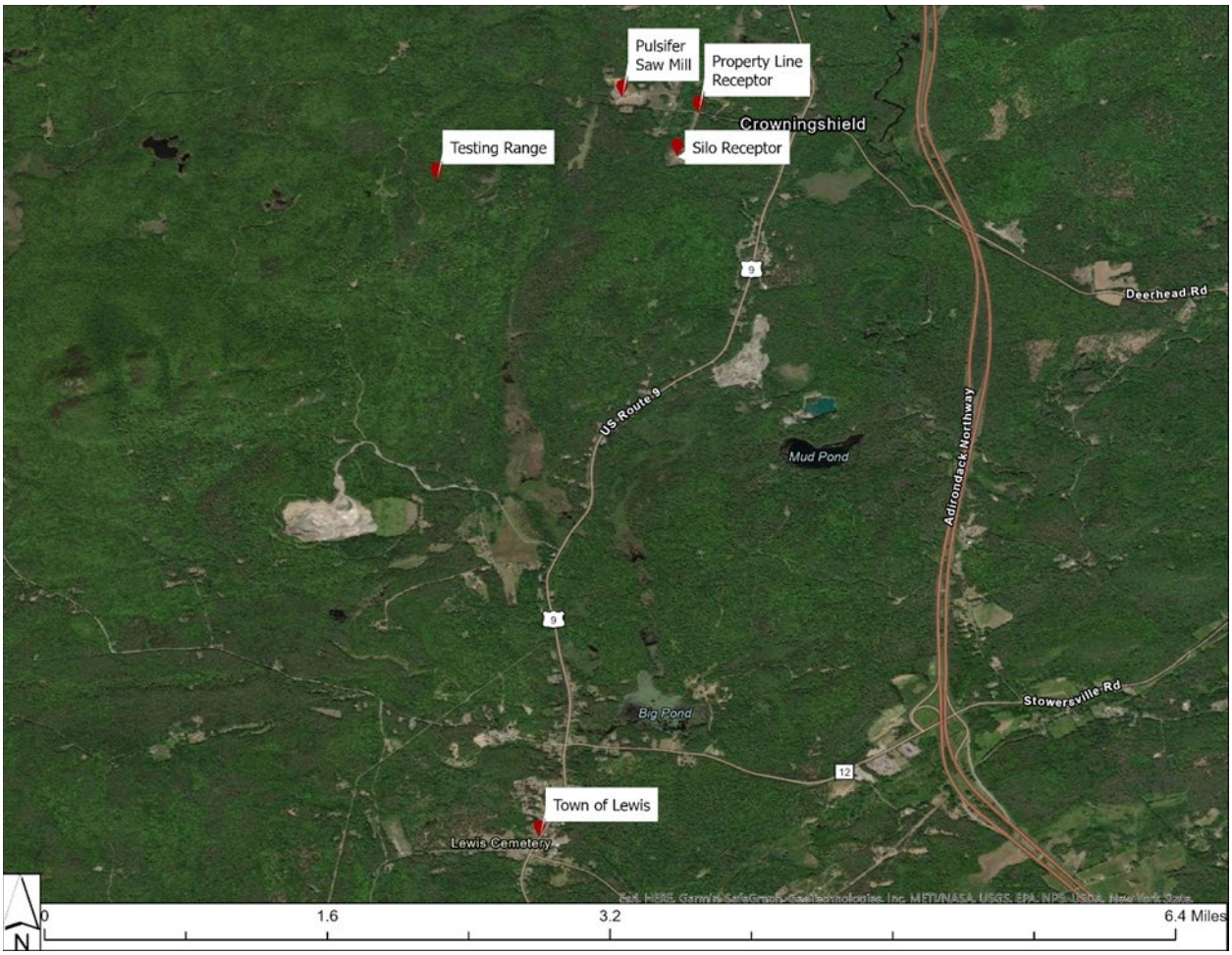

Figure 1. A map of the locations of residences and towns near the proposed site of the testing range

2. **Additive effects of multiple sound sources**
   There is only one sound source, which is the gun under test. The sound of the projectile impacting the end of the range will be mitigated using a soft catch system. Thus, there will effectively be one single impulse noise event per shot fired.

3. **Temperature and humidity**
   The average temperature and humidity in Lewis, New York is[12,13]:
   - January: 18°F; 81% humidity
   - July: 70°F; 74% humidity
   - Yearly: 44°F; 70% humidity

   These weather and temperature factors were included in the following calculations of sound propagation.

[12] Climate & Weather Averages in Essex County, New York, USA., accessed April 21, 2022, https://www.timeanddate.com/weather/@5116680/climate
[13] Weather in Zip 12950 (Lewis, NY), accessed April 21, 2022, https://www.bestplaces.net/weather/zip-code/newyork/lewis/12950

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4. **Time of year**
   Operations will be conducted year-round.

5. **Wind**
   The prevailing wind at Burlington Airport, the closest data point to the proposed test site, is from the south, from Lewis toward the site of the test range. Thus, the prevailing wind direction reduces the potential for wind to carry noise from the proposed testing site towards the town. Figure 2 is a Wind Rose of the prevailing winds at Burlington Airport[14].

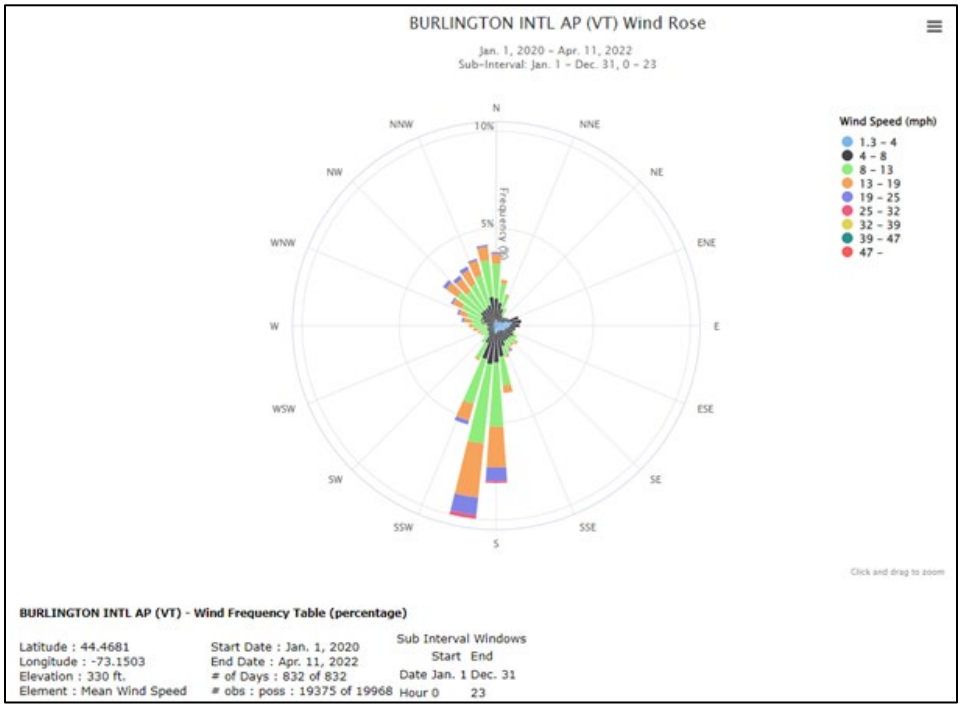
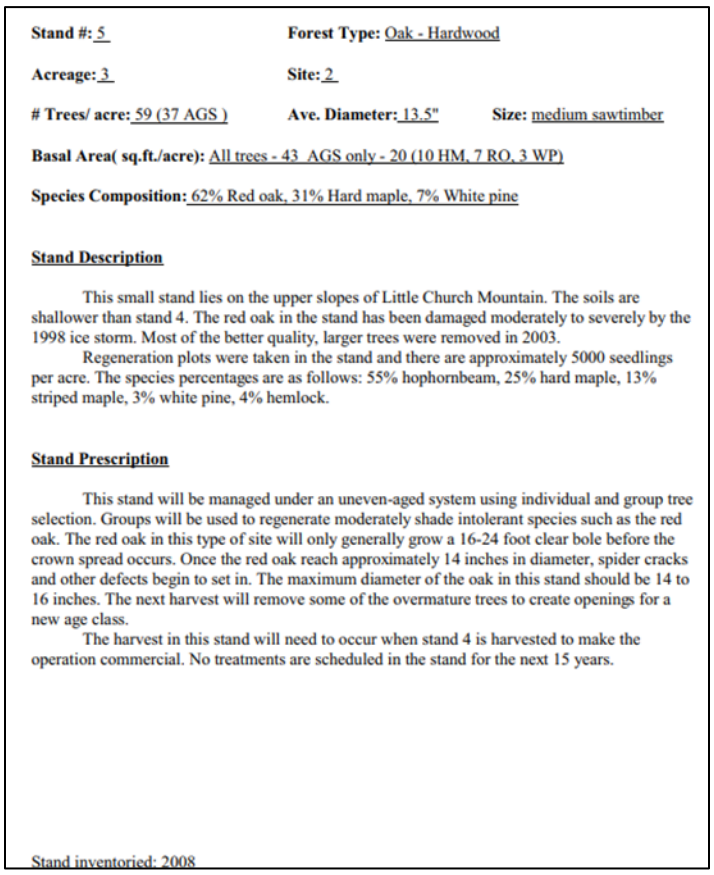


Figure 2. A Wind Rose of the winds at Burlington International Airport. Gathered from cli-MATE, the Midwestern Regional Climate Center's online data portal for accessing climate data and value-added tools.

6. **Land forms and structures**
   Vegetation: The proposed testing site is surrounded by dense vegetation that includes deciduous and coniferous trees, bushes, and grasses. The report on the composition of the forest surrounding the test site includes information on the various tree species growing there; a copy is provided in Figure 3. Many of the trees nearby are red oaks; hard maple species and white pine are also numerous. The stand is of uneven age and height; the heterogeneity in age and height creates a better sound barrier, as there are fewer gaps in the vegetation. Cook and Van Haverbeke (1971)[15] found that **belts of trees between 15 and 30 m wide (49.2 – 98.4 ft)** reduced noise levels by **5-10 dB**; their research also suggests that natural fauna of tall (approximately 30 meters in height) dense trees combined with soft ground surfaces can reduce apparent loudness by at least 50%. (The US Department of Agriculture notes that the

[14] Midwestern Regional Climate Center, cli-MATE, free access is available upon registration; https://mrcc.purdue.edu/CLIMATE/
[15] Cook, David I. and Haverbeke, David F., "Trees and Shrubs for Noise Abatement" (1971). Historical Research Bulletins of the Nebraska Agricultural Experiment Station (1913-1993). 269. http://digitalcommons.unl.edu/ardhistrb/269.

reduction is 5-8 dB for a belt of a similar width and 30 ft in height[16]). Thus, the on-site vegetation at the site of the proposed test range helps create an effective noise buffer that decreases the sound that propagates to surrounding areas, providing natural mitigation. Based on this information, and assuming a 120-meter (393.7 ft) perimeter around the site (120 m is the distance between the firing pad and the base of the mountain slope), we anticipate significant noise attenuation, thereby providing mitigation, of 20 dB[17].



Stand #: 5 **Forest Type:** Oak - Hardwood

Acreage: 3 **Site:** 2

 # Trees/ acre: 59 (37 AGS) **Ave. Diameter:** 13.5" **Size:** medium sawtimber

Basal Area(sq.ft./acre): All trees - 43 AGS only - 20 (10 HM, 7 RO, 3 WP)

Species Composition: 62% Red oak, 31% Hard maple, 7% White pine

Stand Description

This small stand lies on the upper slopes of Little Church Mountain. The soils are shallower than stand 4. The red oak in the stand has been damaged moderately to severely by the 1998 ice storm. Most of the better quality, larger trees were removed in 2003.

Regeneration plots were taken in the stand and there are approximately 5000 seedlings per acre. The species percentages are as follows: 55% hophornbeam, 25% hard maple, 13% striped maple, 3% white pine, 4% hemlock.

Stand Prescription

This stand will be managed under an uneven-aged system using individual and group tree selection. Groups will be used to regenerate moderately shade intolerant species such as the red oak. The red oak in this type of site will only generally grow a 16-24 foot clear bole before the crown spread occurs. Once the red oak reach approximately 14 inches in diameter, spider cracks and other defects begin to set in. The maximum diameter of the oak in this stand should be 14 to 16 inches. The next harvest will remove some of the overmature trees to create openings for a new age class.

The harvest in this stand will need to occur when stand 4 is harvested to make the operation commercial. No treatments are scheduled in the stand for the next 15 years.

Stand inventoried: 2008

Figure 3. Report from Stand 5, located on Little Church Mountain; survey by Northwoods Forest Consultants LLC

Topography: The testing range will be located between Big Church Mountain and Little Church Mountain. The rock structure of the mountains will create an amphitheater effect, thereby reflecting noise to the west of the test area. Consequently, noise to the west of the mountains (the location of the proposed testing range) will be reflected away from the populations in the surrounding areas.

A copy of the site survey of the testing range is provided in Figure 4 (a more detailed copy is provided in Appendix C of this package). The survey revealed that the site proposed for the test range is concave in shape; when looking from west to east across the site, the survey notes that elevation decreases from 1380 ft to 1350 ft, then increases again to an elevation of

[16] US Department of Agriculture National Agroforestry Center, Conservation Buffers: Buffers for Noise Control, https://www.fs.usda.gov/nac/buffers/guidelines/6_aesthetics/4.html.

[17] The slope of Big Church Mountain begins 120 m (393.7 ft) from the firing pad of the proposed test range. A buffer width of 120 m, at 5 dB reduction per 30 m ft of buffer, would provide a noise dampening effect of (120/30 × 5 dB) 20 dB.

1382 ft. The concave shape of the test site means there is no straight line that sound can travel to any persons or habitations in the surrounding area, which aids in corralling sound emitted at the site and reducing noise propagation to surrounding locations.

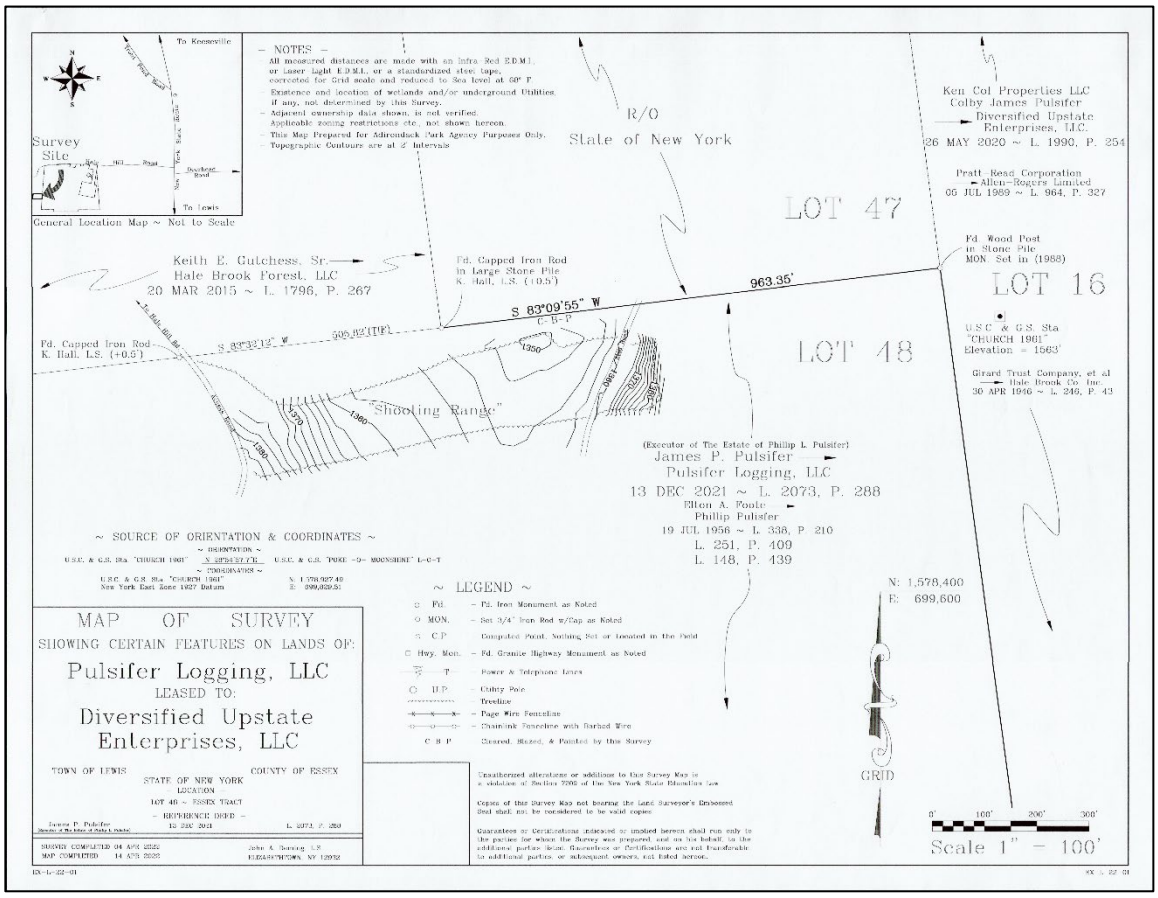


Figure 4. A scanned copy of the scalable site map of the site of the proposed shooting range; note the concave shape of the site

The factors of the topography and vegetation surrounding the site of the proposed testing range were included in the dBmap.net tool modeling that is discussed later in this document. The terrain of the area is marked on the topographic map[18] (available in Figure 5) at 15-ft intervals. For modeling purposes, a ground factor of 1 was used in calculations (on a scale of 0 to 1, 0 is hard ground such as roads and paved areas; 1 is soft ground such as grasses, trees, and other vegetation).

[18] US Geological Survey, Map for Lewis, NY, 1999, viewed in Google Earth; map is available for download at https://ngmdb.usgs.gov/topoview/

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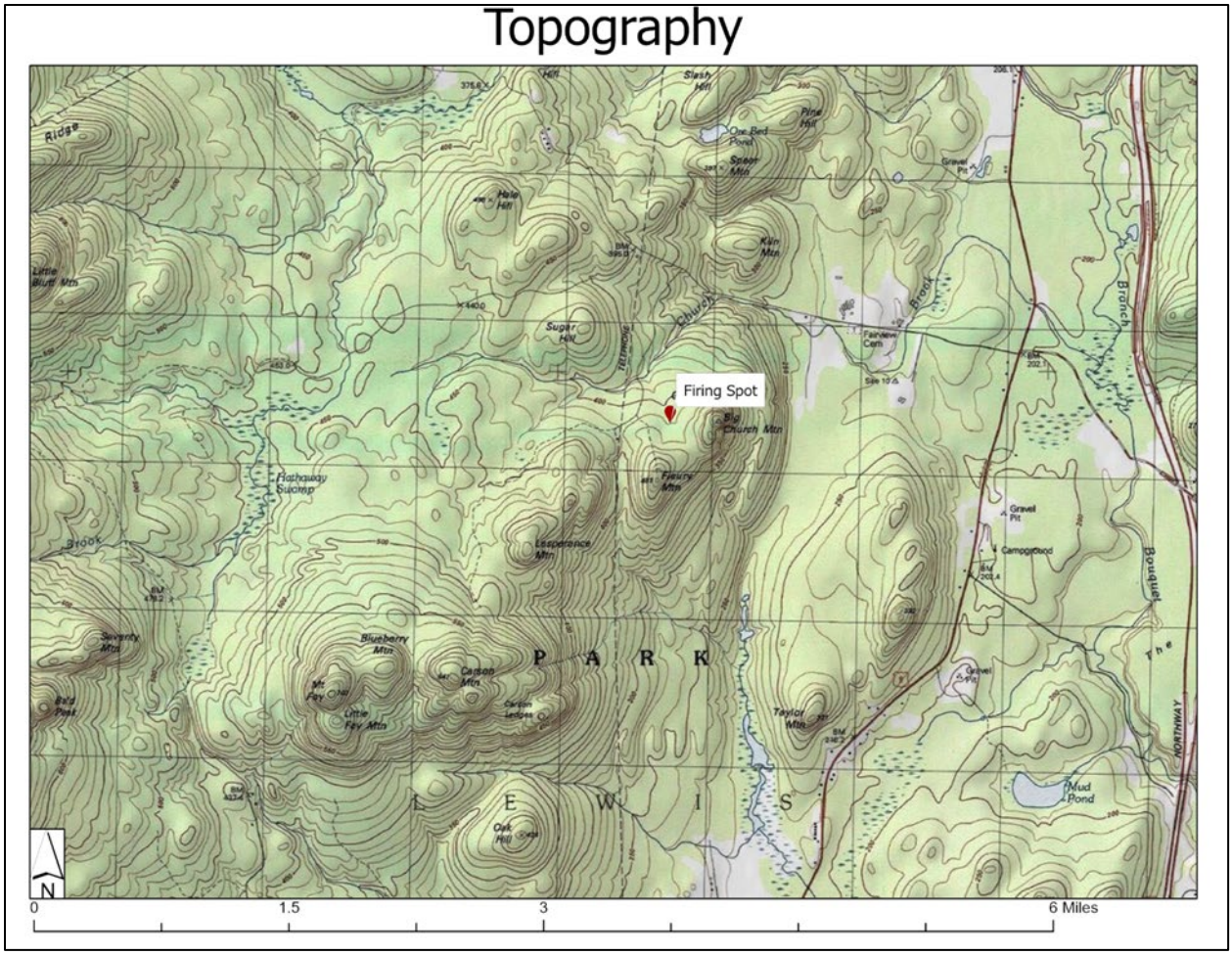

Figure 5. A map of the topography of the area around site of the prosed test range; the site of the proposed test range is marked with a red pin.

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B. IMPACT ASSESSMENT

1. Factors to consider

a. Evaluation of sound characteristics

i. **Ambient noise level:** A noise can only intrude if it differs in character or SPL from the normal ambient sound. Most objective attempts to assess nuisance noise adopt the technique of comparing the noise with actual ambient sound levels or with some derived criterion

- There is a sawmill near the site of the proposed testing range; the sawmill and diesel trucks that visit the sawmill are currently the primary sources of noise in the area. The noise level produced during the day while the sawmill is operating is high, as sawmill machinery can produce noise in excess of 100 dB[19]. Given this information, the estimated background/ambient noise level during the day at the proposed test site is 80 dB(A), similar to light industrial zones.

ii. **Future noise level:** The ambient noise level plus the noise level from the new or proposed source.

- The future noise level is the existing ambient noise level plus the noise level from the new/proposed source. The proposed noise source is impulse noise of infrequent occurrence and short duration (4 milliseconds per occurrence; 1-2 occurrences per day; with an anticipated maximum of 10 occurrences per month). Thus, the current ambient noise level of 80 dB(A) would increase only slightly due to activity at the test range.

iii. **Increase in sound pressure level:** A significant factor in determining the annoyance of a noise is Sound Pressure Level (SPL). SPLs are measured in decibels.

- The sound pressure level emitted by the system under test is quite high (166.1 dB), but the source of the noise emission is quite far from non-participants. The distance and the terrain factors decrease the expected SPL to 66 dB or less (which is lower than the ambient noise at that location), and the duration of the noise is extremely brief: 4 milliseconds. An impulse noise level of 66 dB may be perceived as "annoying" but not "very annoying"[20,21], and the US Army Center for Health Promotion and Preventive Medicine notes that noises of less than 115 dB have a low risk of complaint[22].

[19] Noise Control in Sawmilling, https://www.hse.gov.uk/noise/goodpractice/sawmilling.htm
[20] Skagerstrand A et al., Loudness and annoyance of disturbing sounds – perception by normal hearing subjects, International Journal of Audiology, v56, i10, p 775-783, https://www.tandfonline.com/doi/full/10.1080/14992027.2017.1321790.
[21] US Environmental Protection Agency, information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety, March 1974, https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000L3LN.TXT.
[22] US Army Center for Health Promotion and Preventive Medicine, Directorate of Environmental Health Engineering, Operational Noise Program, New Jersey Army National Guard State Operational Noise Management Plan, Sept 2007, https://www.nj.gov/military/construction-facilities-management/environmental-management/documents/FINALNJARNGSONMP.pdf

For personnel in proximity to the test, proper hearing protection will be provided.

iv. **Sharp and startling noise:** These high frequency and high intensity noises can be extremely annoying. When initially evaluating the effects of noise from an operation, pay particular attention to noises that can be particularly annoying. One such noise is the back-up beepers required to be used on machinery. They definitely catch one's attention as they were meant to do. Continual beeping by machinery can be mitigated (see Section V.C. Mitigation – Best Management Practices). Another impulse noise source that can be very annoying is the exhaust from compressed air machinery. This exhaust is usually released in loud bursts. Compressed air exhaust can also be mitigated if it causes a noise problem by using readily available mufflers or specifically designed enclosures.

- The noise from the test range is short in duration, very low in frequency[23], and has a less startling rise/fall profile, thereby reducing the startle effect. In addition, early warning of an event, coupled with audible warnings (siren) that can be discerned at the nearest receptor site, will significantly reduce any surprise associated with the event.

v. **Frequency and tone:** Frequency is the rate at which a sound source vibrates or makes the air vibrate. Frequency is measured in Hertz (Hz). Frequency can also be classified as high ("sharp"), low ("dull"), and moderate. Pure tones are rare in nature. Tonal sounds usually consist of pure tones at several frequencies. Pure tones and tonal sounds are discerned more readily by the human ear. Pure tones and tonal sounds are compensated for in sound studies by adding a calculated number of dB(A) to the measured sound pressure.

- The frequency and noise intensity value of a Howitzer, measured 4 meters from the barrel, are provided in Table 1[24]. This frequency reduces irritation and impact on a receptor site.

TABLE III. Significance of the frequency range to the energy of an impulse. The measurement site was 4 m from the side of the barrel.

Weapon or explosive	Eliminated frequency range, Hz					
	--	0-20	0-100	0-500	0-1000	0-5K
Rofle, 7.62mm	121	121	121	120	119	108
Light bazooka	149	148	144	140	136	
Heavy bazooka	156	154	149	139		
Mortar, 120mm	146	145	143	138	136	
Howitzer, 122mm	160	157	155	149	145	138
Track mine	153	149	142	133		
200 g TNT	127	127	124	111		

Table 1: Frequency range of the noise generated by used of various types of artillery

vi. **Percentile of sound levels:** Fluctuations of SPLs can be expressed as a percentile level designated as L(n) where a given decibel level is exceeded *n*

[23] Pakkonen R, 1988, Low Frequency High Level Noise Impulses Near Weapons and Explosives, Journal of Low Frequency Noise, Vibration and Active Control, https://journals.sagepub.com/doi/10.1177/026309238800700201.
[24] Pakkonen R, 1988, Low Frequency High Level Noise Impulses Near Weapons and Explosives, Journal of Low Frequency Noise, Vibration and Active Control, https://journals.sagepub.com/doi/10.1177/026309238800700201.

% of the time. A designation of L(10) = 70 dBA means the measured SPLs exceeded 70 dBA 10% of the time. A designation of L(90) = 70 dBA means the measured SPLs were exceeded 90% of the time. L(90) is often used to designate the background noise level.

- For the impulse noise generated at the testing range, it expected that the actual number of shots per day will be two (anticipated to not exceed 10 shots per month), and that the duration of each shot is approximately 4 milliseconds. The attenuation for the sound level at the property line is expected to be 66 dB(A), as seen in Figure 9.

  During the operational time of 10:00 AM to 4:00 PM, there will be an anticipated maximum of 2 shots fired. Each shot has a duration of 4 milliseconds, which results in 8 milliseconds where noise is generated at the testing range. The noise generated at the test range will have an intensity of 66 dB(A) at the edge of the property. Given that the sound pressure level is lower than the background noise level, no significant impact to the receptor site is anticipated.

vii. **Expression of overall sound:** Part of the overall assessment of sound is the Equivalent Sound Level (Leq)[25], which assigns a single value of sound level for a period of time in which varying levels of sound are experienced over that time period. The L eq value provides an indication of the effects of sound on people. It is also useful in establishing the ambient sound levels at a potential noise source.

$$L_{eq} = 10 \log [(1/T) \int (p_A / p_{ref})^2 \, dt] \qquad (1)$$

Where:
L_{eq} = *equivalent sound level (dB)*
T = *time period (in seconds [s])*
p_A = *sound pressure (Pa, N/m^2)*
p_{ref} = *reference sound pressure (2 10^{-5} Pa, N/m^2)*
$= 10 \log [(1/0.04) \int (97 / p_{ref})^2 \, dt]$

UCI used the following values in noise level calculations:

- Background noise level of 80 dB(A)
- Time duration of one business day (8 hours, which is 480 min)
- 2 shots fired (4 milliseconds duration each shot; total duration of 8 milliseconds, which is 0.000133 minutes)
- 66 dB noise level at the property line after each shot

Using the above values, the calculations reveal that there is a negligible difference in noise level across an 8-hr day between a day when two shots are fired and day when no shots are fired. A summary of the equation set-up and result is provided in Figure 6.

[25] The Engineering Toolbox, Sound – L_{eq} – Equivalent Level, https://www.engineeringtoolbox.com/equivalent-sound-level-d_721.html

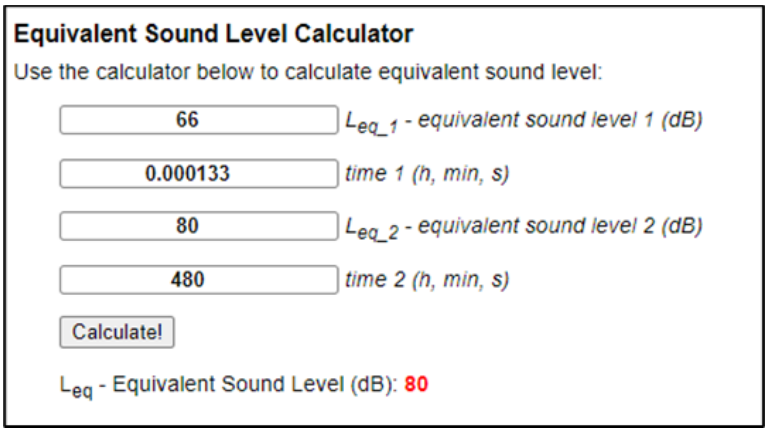

Figure 6. Calculated equivalent sound level for a business day in which two shots are fired; the Equivalent Sound Level of a business day in which two shots are fired is in red; compare this value with the value for L_{eq_2}, the equivalent sound level for a day in which no shots are fired.

b. Receptor Locations

A map of sound receptor locations is provided in Figure 7. The Pulsifer residence (and adjacent sawmill) is 0.96 miles from the site of the proposed test range; the silo is a distance of 1.05 miles away. There is no considered impact on the silo operations, as personnel there will be involved in the test and thereby fully aware of operations.

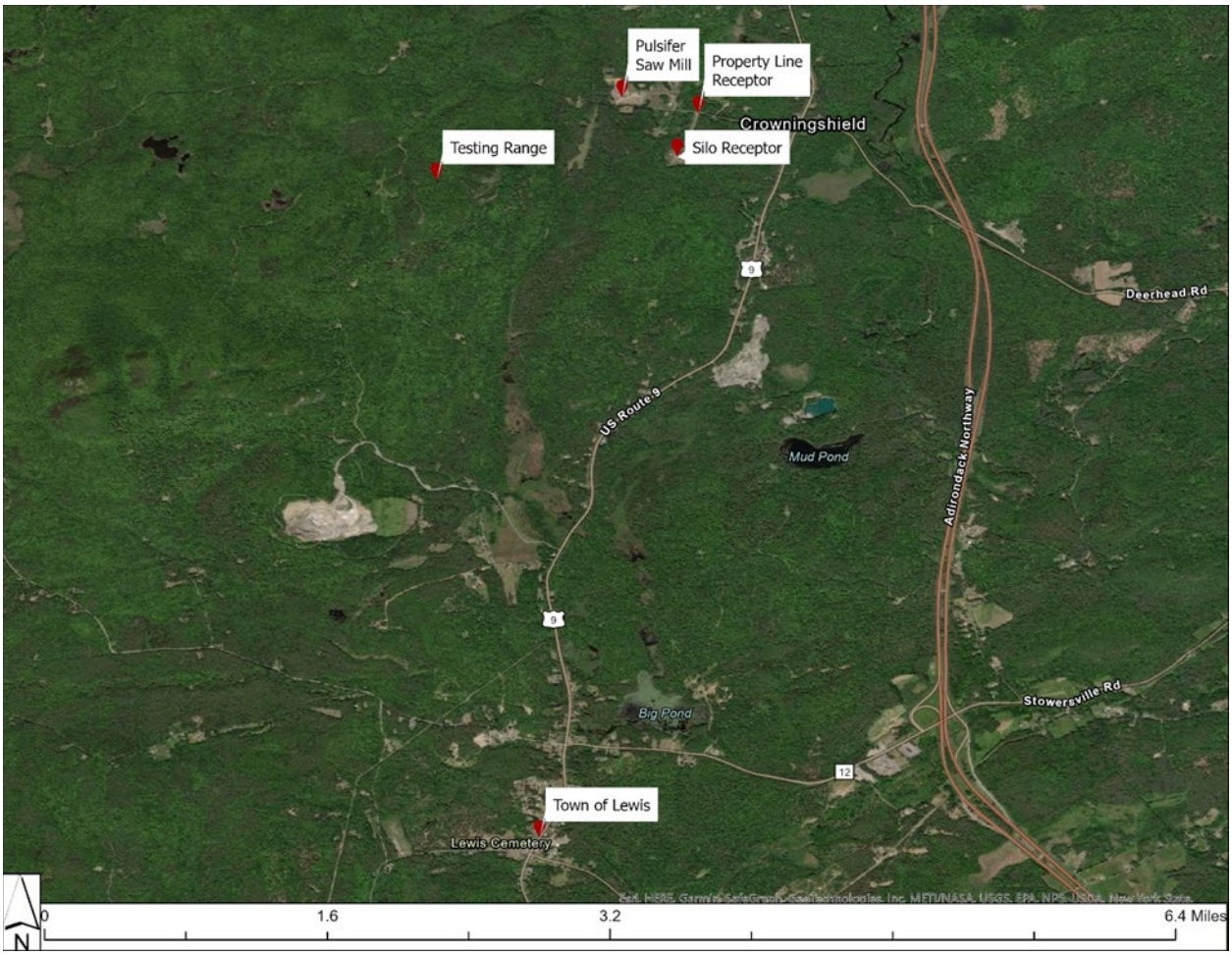

Figure 7. Map of some noise receptor locations around the site of the proposed test range

c. Thresholds for significant sound pressure level increase

Initially, these locations could expect an ambient sound average of 80 dB(A) during the day[26], as they are located near light industrial work such as logging and wood-cutting. During testing, these locations can expect to hear a sound with an intensity of 66 dB(A) for a duration of 4 milliseconds (maximum number of occurrences is 2 per day; anticipated maximum of 10 per month). For comparison, a sound intensity of 70 dB(A) is equivalent to the sound of a vacuum.

[26] A note on units of sound: "dB is used to measure sound, dB(A) decibel scale readings that have been adjusted in an attempt to take into account the varying sensitivity of the human ear to different frequencies of sound. The main effect of this adjustment is that low and very high frequencies are given less weight than on the standard decibel scale." softdb, Measurement in Decibels: What is the Difference Between dB and dB(A)?, May 14, 2019, https://sound.softdb.com/difference-between-db-dba/

2. Situations in Which No Noise Evaluation is Necessary

When certain criteria are satisfied, the need for undertaking a noise impact analysis at any level is eliminated. These criteria are as follows:

a. The site is contained within an area in which local zoning provides for the intended use as a "right of use". It does not apply to activities that are permissible only after an applicant is granted a special use permit by the local government; and
b. The applicant's operational plan incorporates appropriate best management practices (BMPs [see Section V.C. Mitigation – Best Management Practices]) for noise control for all facets of the operation.

Where activities may be undertaken as a "right of use", it is presumed that noise has been addressed in establishing the zoning. Any residual noise that is present following BMP implementation should be considered an inherent component of the activity that has been found acceptable in consideration of the zoning designation of the site.

Not applicable; UCI was told by APA that a noise assessment was necessary. It is included as Appendix D of this application package.

3. **First Level Noise Impact Evaluation** (considered unrealistic)
Describe the sound generated by the howitzer, as the single source of sound

Source	Decibel Level[27]
M109A5/6; Paladin, 155mm self-propelled Howitzer firing M4A2 zone 7 charges	166.1 dB

In **free air**, sound dissipates according to the inverse square law.

$$Lp(R2) = Lp(R1) - 20 \times Log_{10}(R2/R1) \qquad (2)$$

Where:
Lp(R1) = Known sound pressure level at the source of the sound (value is typically measured or provided by the equipment vendor)
Lp(R2) = Unknown sound pressure level at a second location

For these calculations:
Lp(R1) is 166.1 dB
Lp(R2) is the unknown sound pressure level
R1 is 1 meter from the gun under test
R2 is the distance between the noise source and the location of interest

Pulsifer residence and sawmill (0.96 miles from the site of the proposed test range):
Lp(R1) = 166.1 dB
Lp(R2) = unknown
R1 = 1 m
R2 = 0.96 miles (1544.97 meters)
$Lp(R2) = 166.1 - 20 \times \log_{10}(1544.97/1)$
=102.32 dB**

Silo (1.05 miles from the site of the proposed test range):
Lp(R1) = 166.1 dB
Lp(R2) = unknown
R1 = 1 m
R2 = 1.05 miles (1689.8 meters)
$Lp(R2) = 166.1 - 20 \times \log_{10}(1689.8/1)$
= 101.54 dB**

We then used the distance of the nearest non-participant locations and findings by Cook and Van Haverbeke[28] to calculate the muffling effect of dense vegetation, such as that growing at the site of the proposed test range. Cook and Van Haverbeke found that **belts of trees between 15 and 30 m wide** reduced noise levels by **5-10 dB**. Their research also suggests that natural fauna of tall (approximately 30 meters in height), dense trees combined with soft ground surfaces can reduce apparent loudness by at least 50%.

[27] US Army Center for Health Promotion and Preventive Medicine, Hearing Conservation Program, Noise Levels of Common Army Equipment, https://www.nrc.gov/docs/ML0701/ML070120304.pdf
[28] Cook, David I. and Haverbeke, David F., "Trees and Shrubs for Noise Abatement" (1971). Historical Research Bulletins of the Nebraska Agricultural Experiment Station (1913-1993). 269. http://digitalcommons.unl.edu/ardhistrb/269.

Based on Cook and Haverbeke's findings, the two locations of interest (the Pulsifer residence and sawmill and the silo) can expect a conservative noise reduction due to vegetation as follows:

Pulsifer residence and sawmill (0.96 miles from the site of the proposed test range):
dB reduction = 5 dB reduction per 30m, over a distance of 1544.97m
= (1544.97/30) × 5
= a *reduction* of 257.495 dB**

Silo (1.05 miles from the site of the proposed test range)
dB reduction = 5 dB reduction per 30m, over a distance of 1689.8m
= (1689.8/30) × 5
= a *reduction* of 281.63 dB**

** The values determined by the free air calculations assume direct line of sight between the noise source and the receptor, and would result in a sound like a faint thunderclap at the receptor sites. The calculations to determine the muffling effect of dense vegetation suggest that the dense vegetation would render the noise imperceptible at a distance of less than one kilometer from the source of the noise.

Both of these scenarios are unrealistic. For this reason, the modeling tool dBmap.net[29], which incorporates a variety of factors such as terrain and average weather conditions, was used to perform a more realistic analysis. That analysis is provided in the next section of this noise assessment.

[29] MAS Environmental LTD, www.noisetools.net.

4. Second Level Noise Impact Evaluation

For the second level noise impact evaluation, we included all factors about the location of the proposed test range detailed above, and used the tools available on www.noisetools.net to provide a model of sound propagation[30]. This tool includes the ISO1963-2 calculation parameters and standards. ISO1963-2 is a method of calculation for the attenuation of sound during propagation outdoors[31]. This method considers wind propagation of the sound, ground-based temperature inversions, and the averaging of conditions over different seasons or years. The accuracy of the model is ±3 dB at a range of 1 km (0.62 miles) between the source and the receiver.

We modeled the following conditions: the test range emitting a sound with the specifications described in Table 1, at a height of 1 meter off the ground.

To incorporate the terrain factors into the model, we used elevation based on the topography of the location to estimate the reflections and shadowed areas in the model. Figure 8 shows a Viewshed of the site; the Viewshed highlights the areas within line of sight of the proposed testing range. Note that the Pulsifer sawmill and the town of Lewis, NY are in the sound shadow created by Big Church, Little Church, and Fleury Mountains.



Figure 8. A Viewshed of the site of the proposed testing range, created using the Viewshed tool in Google Earth. The site of the proposed test range is marked with a yellow pin. The portions highlighted in bright green are the areas that can be seen from 2 meters above ground level at the site of the proposed testing range.

[30] MAS Environmental LTD, https://noisetools.net/.
[31] ISO 9613-2:1996, Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation, https://www.iso.org/standard/20649.html.

The model includes the yearly average weather conditions for Lewis, NY: 44°F (6.6°C) and 70% humidity.

The model also includes a ground factor to estimate how the noise will reflect off of the surrounding terrain. A ground factor of 0 is hard ground with no vegetation; examples of this type of ground are roads and paved areas. A ground factor of 1 is soft ground, which is terrain entirely covered with grass, trees, and other vegetation. For this series of calculations, the ground factor was estimated to be 1, which best describes the remote, forested terrain around the site of the proposed testing range.

Figure 9 shows the noise intensity values of the area surrounding the testing site. The map is a result of calculations performed using dBmap.net[32], and include the factors and parameters of topography, weather, and initial sound intensity to provide a more accurate estimation of the attenuation of a sound at various receivers near the proposed testing range. At the silo receptor, the noise intensity during a test shot is 65 dB(A) (much lower than the 102 dB determined using free air calculations, provided in the previous section of this noise assessment). The same analysis indicates that the noise intensity from the same shot would be approximately 66 dB(A) at the boundary of the Pulsifer residence and sawmill rather than the 102.32 dB that was determined using free air calculations.

[32] MAS Environmental LTD, https://noisetools.net/dbmap.

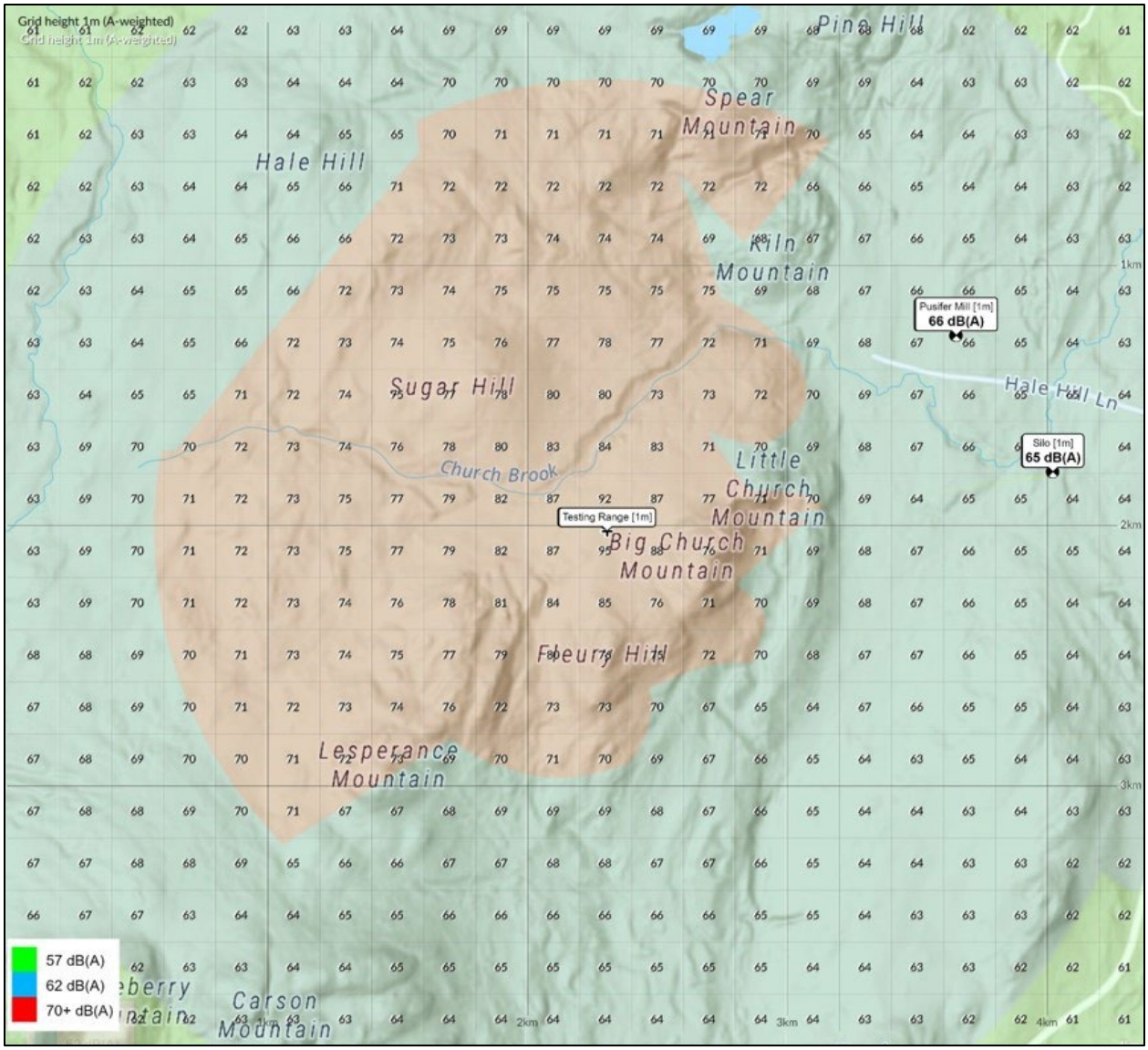

Figure 9. Noise intensity values (in dB(A)) around the proposed testing site when a test shot is fired.

However, one aspect that this model does not fully consider is the extension of the forested area around the proposed test site, and the sound dampening effect of the tall, dense vegetation. As noted previously, the estimated noise reduction of 5-10 dB per 30 meters of buffer width results in additional reduction of perceived sound. Assuming a conservative sound dampening effect of 5 dB per 30 meters of buffer width, the sound dampening effects of the forest and vegetation surrounding the proposed testing range may decrease the sound intensity between the testing range and the slope of Big Church Mountain by an additional 20 dB[33] across the 120-meter distance. The implication of this dampening effect is quite large, and could have a noticeable impact in further reducing the noise levels perceived during testing.

[33] The slope of Big Church Mountain begins 120 m (393.7 ft) from the firing pad of the proposed test range. A buffer width of 120m ft, at 5 dB reduction per 30 m ft of buffer, would provide a noise dampening effect of (120/30 × 5 dB) 20 dB.

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The Viewshed of the site, provided in Figure 8, also shows the areas within line of sight of the testing range: trees and the tops of mountains. This figure thus shows the locations of sound shadows outside of the valley where the testing range is located. This sound shadow is partially modelled in the results of the dBmap analysis shown in Figure 9, but it does not include the noise reduction due the sound dampening effects of the forested area around the proposed test range. The images in Figures 10, 11, and 12 show how the surrounding terrain generates sound shadows over the surrounding areas, and the density of the vegetation around the site of the proposed test range.

5. **Third Level – Mitigation Measures**

Reduce noise:

- UCI will implement the following noise disturbance mitigation measures: only conduct testing between 10:00 AM and 4:00 PM local time, limit the number of shots per day (maximum of 2) and per month (anticipated maximum of 10), and will not test on weekends or holidays.

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Additional Images



Figure 10: Image of a 3D model of the site of the proposed test range; the viewer is looking toward Little and Big Church Mountains. The clearing at the bottom just right of center is the proposed site for the testing range. Image copyright Unconventional Concepts, Inc.

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Figure 11. Photo of a 3D model of the site of the proposed test range. In this image, the viewer is looking toward Little and Big Church Mountains at a higher angle to show that the silo and residences beyond the mountains are shielded from the sound. The clearing just above the bottom center is the proposed site for the testing range. The clearing at the top of the image just left of center is the silo location, which is 1.05 miles from the site of the proposed range Image copyright Unconventional Concepts, Inc.



Figure 12. Photo of a 3D model of an area near the site of the proposed testing range; the viewer is looking toward Fleury Mountain. Note the density of the trees and vegetation surrounding the proposed site. Image copyright Unconventional Concepts, Inc.

Appendix E: CV of Robert Dillon, PhD, PE

Robert E. Dillon, Jr.
DB-05

SUMMARY

- Decorated combat veteran with over 21 years in armored units and acquisition programs
  - Command and staff officer experience in combat units from tank platoon through armored brigade
  - Superior knowledge of large caliber weapons design; broad and effective knowledge of the RDT&E process, development programs, system integration, and engineering concepts
  - Thoroughly familiar with the principles, practices, and methodologies of life-cycle engineering and material acquisition
  - Experience with and a thorough understanding of industrial base operations.
- Licensed Professional Engineer in the Commonwealth of Virginia
  - In-depth knowledge in physical chemistry, thermofluid sciences, aerodynamics, computational fluid dynamics, heat transfer, energy, and propulsion systems
  - Superior record of developing and leading interdisciplinary teams consisting of government, industry, and academic members to attack existing and emerging gaps in the technology and manufacturing bases
  - Consulted, taught, directed, and supervised graduate and undergraduate research in incompressible and compressible aerodynamics, computational fluid dynamics, HVAC design, and automotive, mechanical, and weapons systems design at top government and private research and academic institutions

RELEVANT EXPERTISE AND EXPERIENCE

Research, Development, Test, and Evaluation

Director

Benét Laboratories, US Army, Watervliet, New York
May 2019 – January 2021
DB-5, 40 hours per week; $170,968 yearly salary

- Personally led and managed a major engineering and scientific organization engaged in research, development, engineering production, manufacturing, prototyping assembly fabrication, testing and production/field support of weapons systems and associated technologies.
- Developed and oversaw technology roadmaps, strategic and short- and long-range planning integrating facility, personnel, and technical skill resources for the preservation and advancement of in-house armaments expertise.
- Coordinated and oversaw the preparation of program documentation including plans, schedules, budgets, forecasts and reports to educate, persuade, and defend complex concepts and positions to ARDEC and DoD/Army management, congressional committees, and industry and academia officials.
- Oversaw employee performance criteria and rating techniques, awards, travel, training/development, and technical/programmatic items, ensuring compliance with laws/regulations.
- Ensured PEO, DA, OGA and industry stakeholders and customers were satisfied with Benét services. Personally met with and directly interacted with key stakeholders on Benét services to ensure customer satisfaction and address potential issues early.
- Empowered first line supervisors in identifying organizational structure opportunities for improvement. Opened two-way dialogue and continuous communication to the workforce.

Science Advisor

Benét Laboratories, US Army, Watervliet, New York
February 2003 – May 2019

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DB-5, 40 hours per week; $160,968 yearly salary

- Chief Scientist and leading technical authority on all aspects of large caliber cannons across the acquisition life cycle from basic and applied research to design, development, testing, fielding and sustainment; accountable to address complex, multi-disciplinary, and highly dynamic technical and programmatic challenges
- Singularly accountable for the planning, development, and evaluation of technical programs to advance the state of the art in large caliber weapons systems, materials and manufacturing processes:
    - Identified technology gaps, facilities, and equipment to develop programs and the knowledge base and skills needed to preserve and reinvigorate in-house core competencies of the Army's premier large cannon research center
    - Focused efforts on translating promising research into solutions for increased cannon bore protection, superior thermal management and mitigation, increased muzzle brake effectiveness and reduced blast characteristics.
    - Ensured the insertion of these key technologies into developmental programs. Examples are: computational fluid dynamics (CFD) for muzzle device and bore evacuator efficiency, blast and flash mitigation and stress distribution; laser engineered net shape manufacturing (LENS) for tailored properties for high strength steel and near net shape prototyping; advanced smart machine platform initiative whereby 3D design data is translated directly to the manufacturing facility eliminating human error, redundancy and saving large hours on the shop floor.
    - This initiative also included machine health monitoring and best practices for machine tool scheduling.
- Through congressional partners secured $20M annually and forged partnerships with over 25 universities and industry partners. These partnerships provided the vital discretionary funding needed to enhance our core competencies and skills and advance the state of the art in large caliber cannon performance.
    - Through these programs we developed novel and innovative breadboard systems to demonstrate the feasibility and practicality of new and innovative technologies such as the rarefaction wave gun concept.
- Made adjustments in program areas as needed to meet current and long-range objectives as requirements fluctuated and evolved over the program life. Modified and ensured internal administrative processes minimized operational costs and burdens while ensuring applicable laws, regulations, policies and internal procedures were adhered to.
- Served as a key member of ARDEC management on a number of committees and advisory groups, providing expert technological and management advice on matters of critical importance to the mission, involving controversial as well as advanced and difficult technical issues.
- Regularly interacted with executives of other government agencies, higher commands, industry and academe to resolve issues of critical importance and develop cooperative programs. Hosted VIP visitors including foreign representatives, members of congress and their staffs, executives, general officers, other politicians, academic and industry partners.
- Coordinated preparation of program plans, schedules, budgets, forecasts, technical reports, and briefings to DoD/DA management, congressional committees, and industrial and academic officials. Responsible for the coordination and integration of the work of a team of more than 200 technically accomplished and highly dynamic and aggressive personnel, maintaining a clear vision and direction to complete and address mission goals.

Associate Director for Technology

Benét Laboratories, US Army, Watervliet, New York

June 2000 – February 2003

GS-15, 40 hours per week; $115,000 yearly salary

- Led and managed a major ARDEC engineering/scientific organization accomplishing highly complex mission-critical programs with significant impact on national defense capability

consisting of 55 scientists, engineers, technicians, and support staff conducting basic and applied research in support of DoD and external clients.

- Developed and implemented technical and programmatic strategies, oversaw technology roadmaps and long- and short-range plans that integrated facility, personnel, and technical skill resources for preservation of in-house armaments expertise.
- Directed scientific study and experimentation toward increasing knowledge and understanding in the scientific field of material properties and behavior that can be exploited for military purposes in large caliber cannon, projectile, and armor development.
- Assured equitable supervisory decisions on such matters as employee performance criteria and rating techniques within the organization.
- Made decisions on significant awards, long-term leave requests, high-cost travel, and major training/development proposals.
- Approved proposed reassignments, promotions, and selections for vacancies; interviewed and made selections for subordinate supervisory positions.
- Intervened through leadership and empathetic skills to reinvigorate and motivate low performing employees.
- Took immediate action on serious behavior and disciplinary matters.
- Established performance criteria for subordinate supervisors and evaluated their performance.
- Aggressively ensured EEO/EO principles were adhered to throughout the organization.
- Ruthless in educating the workforce on the inappropriateness of bullying and other forms of harassment including but not limited to sexual harassment.
- Ensured compliance with all applicable laws, regulations and best practices, as well as institutional policy, procedures and guidelines. Set a personal example of impeccable conduct and leadership, both on and off duty.

Deputy Project Manager
Benét Laboratories, US Army, Watervliet, New York
1981 -1984
Captain, O-3, 40 hours per week; $45,000 yearly salary

- Directed the efforts of 13 engineers and technicians conducting Concept Exploration consisting of competitive, parallel, short-term concept studies.
- The focus of this effort was to define and evaluate the feasibility of alternative concepts and to provide a basis for assessing the relative merits of each.
- Analysis of alternatives was used to facilitate comparisons of alternative concepts.
- The project entered Component Advanced Development culminating in the XM291, 140 mm weapon system. 1981-1984

Army Acquisition Corps Member
Certifications:
Level 3 Engineering
Level 2 Program Management

Military
Armor Officer with over 21 years of commissioned service.

Operations Officer of an armored brigade during Operations Desert Shield and Desert Storm. Planned, forecasted, evaluated and designed operational training program for an armored brigade consisting of 4500 men and women. Direct supervisor of a planning staff of twelve persons. Forecasted budgetary requirements and supervised yearly training expenditures to ensure compliance with the $2.7M training budget. Cited for excellence in forecasting and management of the training budget. 1990-1991, Major, O-4.

Executive Officer of a forward-deployed tank battalion. Forecasted, planned, evaluated and designed the logistical, personnel, and maintenance budget and programs for an M1A1 equipped tank battalion

consisting of 600 people and 250 vehicles. Formulated and monitored annual budget of $1.7M. Cited for developing an accurate predictive algorithm for budget expenditures. 1988-1990, Major, O-4.

Tactical Systems Analyst, US Army Infantry School and Center. Participated in force development studies to define information on the projected mission needs of the mechanized infantry units. The mission needs were defined in broad operational terms and then evolved to specific operational requirements. A series of tactical scenarios were conducted using applicable gaming theories and Monte-Carlo simulations to assess the relative merits of each concept in a realistic tactical scenario with logistical burdens. 1979, Captain O-3.

Commanding Officer of a forward deployed MTOE Tank Company consisting of 18 main battle tanks and 89 men. Responsible for the tactical employment of the company as part of a larger force consisting of pure armor or as part of a combined arms team involving mechanized infantry and artillery fire support. Gained firsthand experience with the current and projected mission needs of the user. Developed the experience needed to define mission needs in broad operational terms based on specific operational requirements. 1977-1979, Captain, O-3.

Academic

Associate Professor of Mechanical Engineering with Tenure

Rose-Hulman Institute of Technology, Terre Haute, Indiana
1995-2000
40 – 60 hours per week; $70,000 yearly salary

Developed new curricula in the areas of computational fluid dynamics and hypersonic and high temperature gas dynamics. Consultant for US Army on several technical projects involving blast wave formation, propagation, and attenuation. Designed specialized muzzle brakes to enhance recoil reduction and minimize blast overpressure.

Associate Professor of Mechanical Engineering

US Military Academy
1991-1995, Lieutenant Colonel O-5; 40 hours per week, $55,000 annual salary
1984-1987, Major, O-4, 40 hours per week; $47,000 yearly salary

Director of Mechanical, Weapons Systems, and Automotive Design. Directed and taught the capstone design course to graduating seniors in the mechanical engineering curriculum consisting of the design of a total armored weapon system, as well as other system life-cycle elements. The capstone design course pursues a structured, disciplined, and documented technical effort through which systems products and processes are simultaneously defined, developed, and integrated. The capstone teams are organized in a systems engineering approach as part of an overall integrated product and process development effort using multidisciplinary teamwork. Student design teams conducted preliminary design of systems and presented to the appropriate PM staff. In partnership with the Walter Reed Army Institute for Research, supervised student design teams in the design of future dedicated combat medical evacuation vehicles. Emphasis was on ultra-lightweight armor, advanced cannons, and high-performance suspension systems.

EDUCATION

Acquisition

Congressional Operations
Advanced Systems Planning Research Development and Acquisition
Intermediate Systems Planning Research Development and Acquisition
Intermediate Systems Acquisition Management
Fundamentals of Systems Acquisition Management

Military

Air Command and Staff Officer Course
Command and General Staff Officer Course
Infantry Officer Advanced Course

Armor Officer Basic Course
Ranger
Airborne

Academic

PhD, Aeronautical Engineering, Rensselaer Polytechnic Institute, Troy, New York, 1983
Dissertation: A Method of Analyzing Perforated Muzzle Brake Performance.
ME, Aeronautical Engineering, Rensselaer Polytechnic Institute, Troy, New York, 1981
Thesis: Heat Transfer Rates for Laminar, Transition, and Turbulent Boundary Layers and Transition Mechanism on Shock Tube Wall.
BS, US Military Academy, West Point, New York, 1974

PUBLICATIONS

35 technical reports and open literature reports.
17 invited lectures
A bibliography is available upon request

PANEL MEMBERSHIPS

Joint Defense Manufacturing Technology Review Panel – Metals 2006-2009
Army ESTCP Peer Panel Member, 2003 – 2005
Army EQBRD Peer Panel Member, 2002 – 2005
ARDEC Factor IV Panel Member, 2001 – 2009
ARDEC STAC Member, 2016 – 2018
ARDEC ILIR Panel Member, 2003 – present
ARDEC Quality Review Board Member, 2003 - 2008

AWARDS AND HONORS

Acquisition

Department of the Army Research and Development Achievement Award for Leadership Excellence, 2011
Best Paper Award, 26th Army Science Conference, 2008
US Army Materiel Command Greatest Invention Award, 2002
Best Paper Award, 22d Army Science Conference, 2000

Military

United States
Legion of Merit
Bronze Star
Meritorious Service Medal with three oak leaf clusters
Army Achievement Medal
National Defense Service Medal with bronze service star
Southwest Asia Service medal with two bronze service stars
Army Service Ribbon
Overseas Service Ribbon with numeral 2
Knight of the Honorable order of Saint George
Kingdom of Saudi Arabia
Kuwait Liberation Medal
State of Kuwait
Kuwait Liberation Medal

Academic

"Teacher of the Year," Awarded by the Triangles Fraternity, Rose-Hulman Institute of Technology for Teaching Excellence, 1995-96.

3rd NIPA

THIRD NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on May 12, 2022. The submission provided important information in response to the Agency's January 13, 2033 Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's December 6, 2021 and January 13, 2022 NIPAs, the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the NIPAs was not submitted and is required to review the application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

June 6, 2022
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

Cc: Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to Frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible. Electronic copies of plans must be fully scalable.

1. **January 13, 2022 NIPA Item 1:** The submitted site plan titled, "Map of Survey Showing Certain Features of Lands of Pulsifer Logging LLC to be leased to "Diversified Upstate Enterprises LLC," prepared by John Deming, PLS and dated April 14, 2022, does not indicate the proposed boundaries of the lot to be leased and does not indicate the proposed size, just a cleared area labeled as "Shooting Range". Utilizing the scale provided within the PDF, the cleared area as measured along the limits of clearing is approximately 2.75 acres in size. Please confirm whether this is the proposed lease area size. In addition, an "edited copy of certified map" was provided that indicates a purple oval, not labeled, a yellow box labeled as "firing pad", and a green box labeled as "target area." Utilizing the scale provided with the PDF, the yellow box labeled "firing pad" is approximately 38 feet by 60 feet and the target area is located approximately 571 feet away and is approximately 52 feet by 61 feet in size. The original application materials indicated that the firing pad was to be constructed of a 100-foot by 100-foot crushed stone pad. Please clarify if the proposal has been revised to reduce the lease area and firing pad area with no crushed stone imported to the site. Please clarify and revise the professionally prepared site plan map to indicate the lease area boundaries, the location of any proposed safety signage, and the size and the location and dimensions of the firing pad and target area accordingly. In addition, please clarify what the purple oval represents.

   In addition, the site plan indicates that the proposed lease is to Diversified Upstate Enterprises, LLC. The application and prior responses have come from Michael Hopmeier and Unconventional Concepts, Inc. Please clarify the relationship between Diversified Upstate Enterprises and Unconventional Concepts Inc. and provide signatures from the principals involved with Diversified Upstate Enterprises, LLC as necessary.

2. **January 13, 2022 NIPA Item 4**: Noise assessment details included in the submission received May 12, 2022 conflict with what was previously submitted and further clarification is necessary. For instance, the provided response materials state that "(B)ased on recommendation from the APA, further research on the noise source was performed. Based on that research, the actual noise source is assumed to be 166.1 dB." The provided response materials do not clarify how this revised noise source estimate of 166.1 dB was determined, how the previously presented noise source of 185 dB was in error, or, for example, whether a different cannon or munition is being proposed to be tested resulting in different source noise levels. Absent a detailed explanation regarding this significant reduction of 19 dB in noise source, the provided noise assessment is unsupported. Most notably, the provided noise assessment indicates that the equipment being tested is a M109A5/6; Paladin, 155mm self-propelled Howitzer firing M4A2 zone 7 charges, however the provided footnote reference to a link of a PDF of 2006 Noise Levels of Common Army Equipment by USACHHPM indicates that the location of the 166.1 dB noise measurement is from "in fighting compartment with hatches open except drivers," which is not

representative of a worst case scenario of a maximum noise intensity emitted open air with no armored tank walls or other sound mitigation barriers in place. Please address these discrepancies.

The materials received May 12, 2022 do not adequately address the January 13, 2022 NIPA Item 4 with respect to providing a more complete noise assessment report, including a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0 mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Road and State Land classified as Wild Forest.

The provided noise assessment only evaluates the nearest off-site residential receptor dwelling as the Pulsifer residence near the sawmill, but this submission indicates that the dwelling is located 0.96 miles east of the noise source, where the previous submission materials indicated that it's located 1.22 miles from the source. Please clarify whether the firing pad location has changed and provide an accompanying street address for this nearest receptor. Please also provide the distance of the noise receptor from the existing enclosed sawmill and include an estimate of vegetated buffer from the sawmill to this receptor and any other nearby receptors of the sawmill as further discussed below.

The provided noise assessment indicates that "the estimated background/ambient noise level during the day at the proposed test site is 80 dB(A)," but also indicates that the proposed firing pad is to be located approximately 1 mile (0.96 mi) from the sawmill as detailed above. Please reconcile. The provided noise assessment indicates that the estimated background/ambient noise level during the day at the nearest receptor of the Pulsifer Residence is also 80 dBa. Please note that the referenced commercial use site is subject to Agency Permit 1991-0170, which authorized the expansion of an existing sawmill and wood using facility. As described in project description 6h and project impact 17a of 1991-0170, the facility design was intended to control and reduce noise, including concrete block/sand fitted walls, roofed structure with hanging commercial noise absorbing baffles for the debarker, with bark blown directly into a closed box trailer; full enclosure of the main sawmill with a semi-permanent solid wall on the east end removed only for equipment installation and repair; sawdust will be blown directly into a closed box trailer; chipper installed inside a concrete block, roofed structure with chips blown directly into a closed box trailer; dowel mill machinery to be fully enclosed in mill building with baffles and log barriers used to reduce noise. Without accounting for the noise mitigation measures in place at the enclosed sawmill, in addition to the distance from the residential dwelling to the enclosed sawmill, and absent noise meter readings, the estimated ambient noise level of 80 dBa is unsupported.

Please clarify whether there are tanks or other armored machinery now proposed to be utilized on-site and provide and evaluate the corresponding sound pressure levels in a revised noise assessment.

The noise assessment materials received by the Agency on May 12, 2022, appear to be prepared by Unconventional Concepts, Inc. and do not include a professional stamp on the submission materials. The preparer of any revisions submitted to address the items above must be a NYS licensed professional familiar with NYSDEC's Program policy Assessing and Mitigating Noise Impacts (ny.gov).

3. **January 13, 2022 NIPA Item 5**: The provided response states that no additional sound pressure level reduction methods are proposed. Based on the information provided regarding potential sound impacts, this is inadequate. As detailed in NYSDEC's noise policy, the addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65dB(A). As the provided ambient noise level of 80 dBa is unsupported and needs to be revised per NYSDEC's noise policy, please provide an accompanying noise mitigation plan that includes sound pressure level reduction methods and also addresses the following:

   - The materials indicate that for personnel within proximity to the site, hearing protection will be provided. Please specify what this minimum specific hearing protection safety distance is from the firing pad location.
   - The materials indicate the Town Supervisor of the Town of Lewis will coordinate with local Emergency Management Services to notify any citizens in close proximity to the test range of the test schedule, by phone or e-mail, 72 hours prior to the testing and again 24 hours prior to testing. Please provide documentation of the agreement with the Town of Lewis that they are responsible for notification. Additionally, please define "close proximity" to the test range.

Please note that, based upon the application materials submitted to date, the proposal as presented consists of testing munitions year-round up to 120 times per year with an estimated munitions firing noise source of 185 dB with no noise source mitigation measures proposed. The U.S. Department of the Army considers any impulse noise greater than 140 dB hazardous and requires their employees to wear hearing protection. In addition, the US Bureau of Mining research has documented damage to residential dwelling window glass from over air pressure blasts of greater than 133 dB with the federal standard 30 CFR § 816.67 set at 133 dB on over air blasts associated with mining activities. Accordingly, based on potential noise impacts alone, absent revisions to the project proposal, the project does not meet the criteria for issuance of a permit under Agency law.

H2H Scope of Work
09/16/2022

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H2H GEOSCIENCE ENGINEERING

179 River Street, Troy, New York 12180

Environmental Professionals
Geologic Consultants
Construction Services

(518) 270-1620/Fax (518) 270-1672

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency

RECEIVED

Date: September 16, 2022

September 16, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analyses at the above reference site

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a 330 yds. long ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following scope of work.

Scope of Work

H2H intends to conduct the following scope items to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application:

Task 1: Sound Level Monitoring

H2H has developed a site map (Figure 1) showing property boundaries, and APA Land Use Classifications within a 2-mile radius of the proposed ballistics test range (Source). Figure 2 identifies three (3) proposed sound level monitoring locations surrounding the Source to best determine ambient sound level conditions.

H2H proposes to conducted sound level monitoring at each of the three (3) monitoring location to identify and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for each monitoring location.

Task 2: Sound Level Modeling

Based on Source sound level data provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURE 1 - APA Land Classification

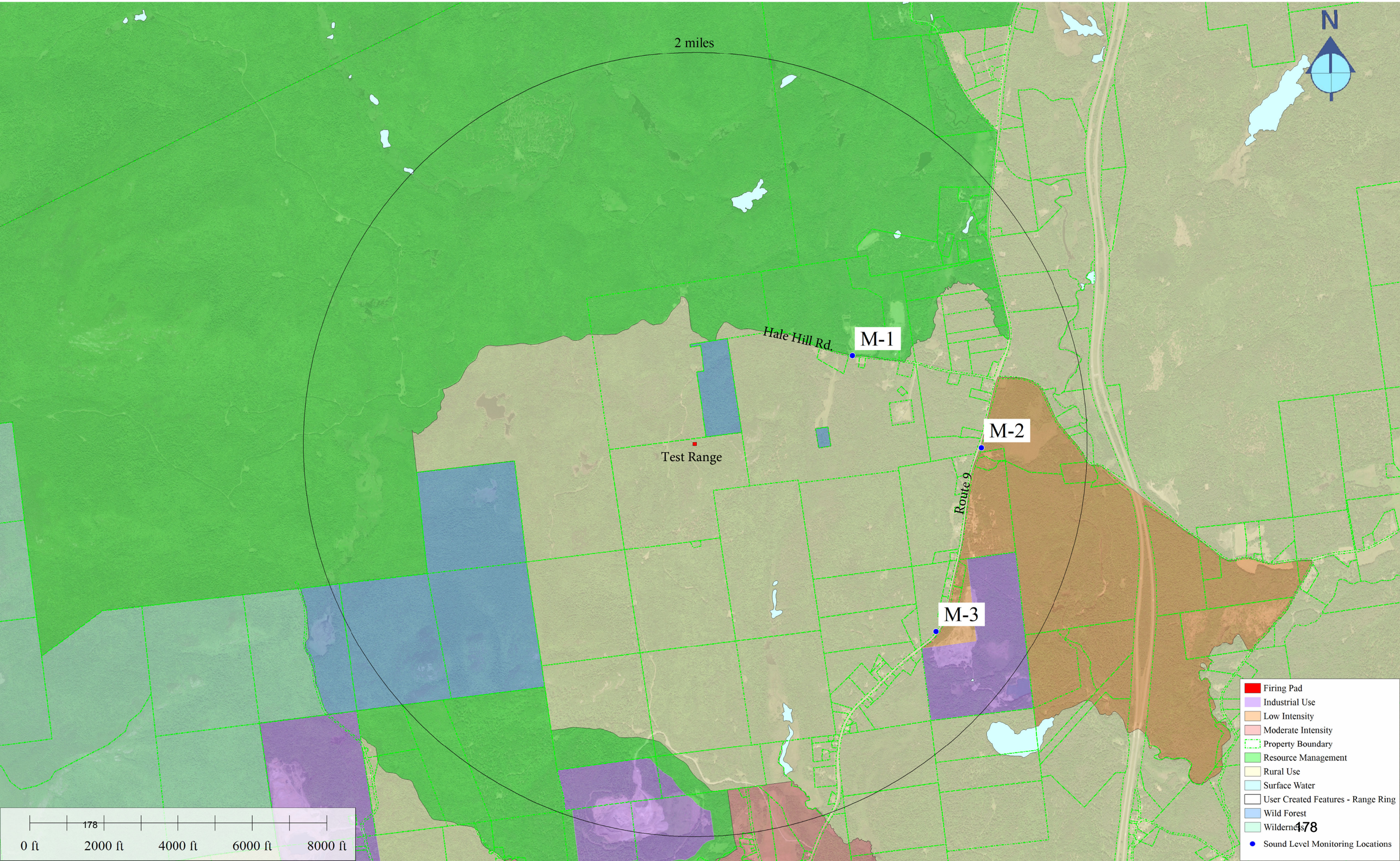
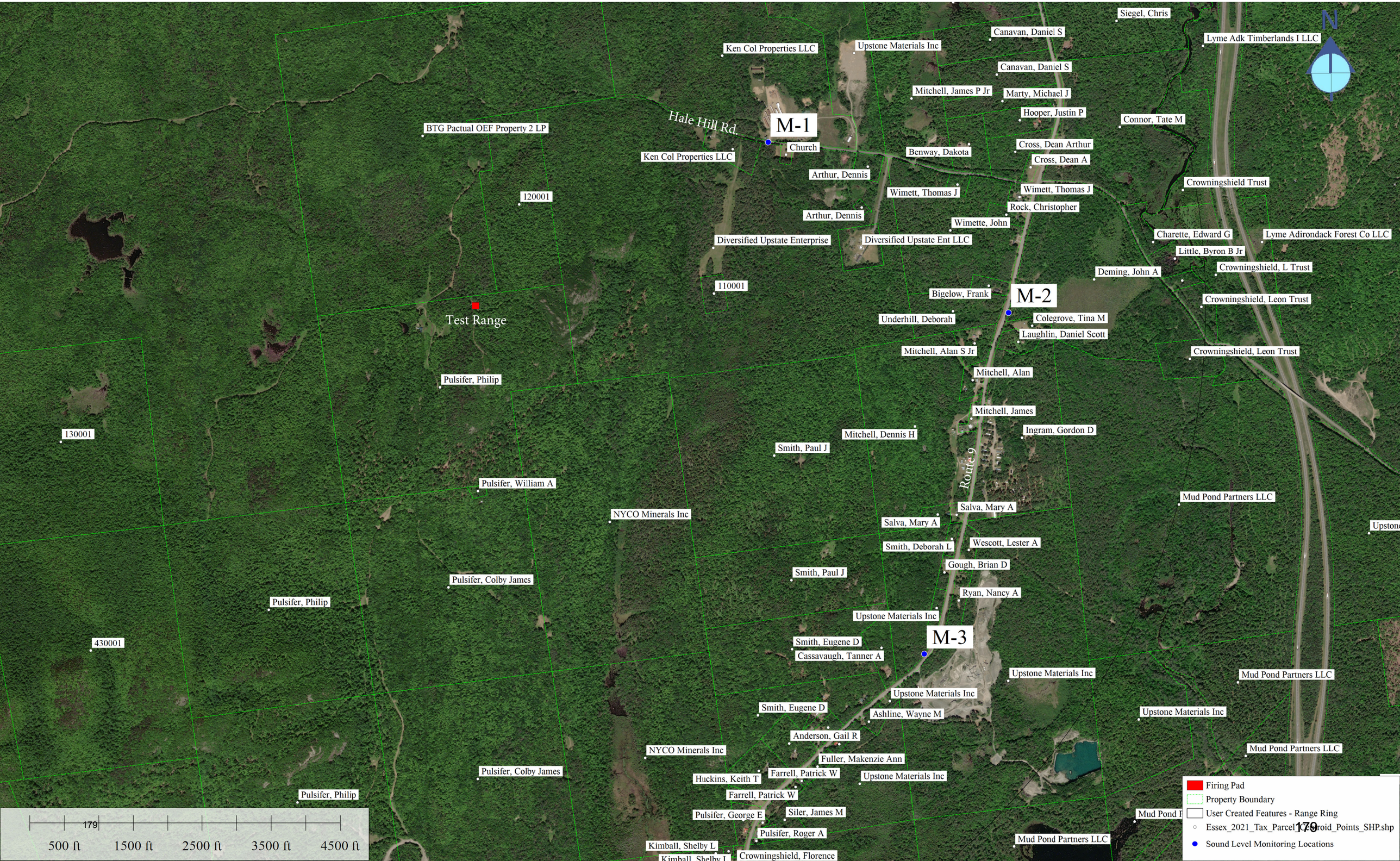


FIGURE 2 - Proposed Monitoring Locations



APA EPS Letter 2 (09/28/2022)

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September 28, 2022

Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
1749 River Street
Troy, NY 12180

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Michael Polacco:

Thank you for the letter dated September 16, 2022 describing the scope of work to perform a sound analysis in relation to APA Project No. 2021-0276. Review of the submitted materials indicates the study would not adequately address Item 2 of the Agency's June 6, 2022 Third Notice of Incomplete Permit Application (NIPA).

The provided scope of work states that the three proposed monitoring locations were selected to "identify and note major sources of sound contributing to ambient conditions." Conducting the noise assessment using only these locations would not adequately evaluate potential impacts to residential noise receptors not located in proximity to or directly across from existing commercial use locations. In addition, the scope of work description does not provide for an assessment of noise impacts to adjacent State Land classified as Wild Forest or Wilderness.

As stated previously, utilizing NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts, please provide a more complete noise assessment report including a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0 mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Road and State Land classified as Wild Forest.

If you have any questions regarding this letter or the project review process, please contact me at the phone number listed below.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

Attachment: June 6, 2022 NIPA

cc: Michael Hopmeier, Unconventional Concepts, Inc.
Matthew D. Norfolk, Esq.
Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

H2H Scope of Work
11/9/2022

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H2H GEOSCIENCE ENGINEERING

179 River Street, Troy, New York 12180

Environmental Professionals
Geologic Consultants
Construction Services

(518) 270-1620/Fax (518) 270-1672

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency

RECEIVED

Date: November 9, 2022

November 9, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analysis at the above reference site.

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following Scope of Work (SOW).

Scope of Work

H2H intends to collect ambient (no unapproved UCI operations taking place) sound levels, as well has additional sound level modeling to support a revised sound study, to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application.

Task 1: Sound Level Monitoring

H2H has developed a Site Overview Map (Figure 1) showing all identified receptors within a two-mile radius (Project Area) of the ballistics testing Firing Pad. The Firing Pad (100 ft. by 100 ft.) is in the northeast corner of parcel 38.1-1-31.000 (UCI Site). The Control Operations Area is located adjacent to the Firing Pad; the Target Area is located 590 ft. west of the Firing Pad (Figure 2).

Forty-two Residential Receptors (occupied residential structure) were identified with the two-mile radius. Four parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius.

Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Firing Pad to best determine ambient sound level conditions in the Project Area. H2H will conduct sound level monitoring at each of the identified five-monitoring location (Figure 1) to identify, and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for the area surrounding each monitoring location.

The following is a description of each sound monitoring location:

M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-2 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surround Pulsifer Rd.

M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

M-4 - Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Task 2: Sound Level Modeling

Based on source sound level data (loudest kinetic systems to be tested) provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURES

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FIGURE 1 - SITE OVERVIEW MAP

730000 ft
740000 ft
2010000 ft
2000000 ft
1990000 ft

N

2 miles

UCI Site

M-1
M-2
M-3
M-4
M-5

R-1 Pulsifer
R-2 Pulsifer
R-3 Benway
R-3 Benway
R-4 Rock
R-5 Wimett
R-6 Cross
R-7 Hooper
R-9 Connor
R-10 Siegel
R-11 Canavan
R-12 Stone
Canavan
R-13 Bigelow
R-14 Ero
R-15 Williams
R-16 Gibson
R-17 Drummond
R-18 Bigelow
R-19 Colegrove
R-20 laughin
R-21 Mitchell
R-22 Mitchell
R-23 Mitchell
R-24 Mitchell
R-25 Ingram
R-25 Salva
R-26 Smith
R-27 Wescott
R-29 Ryam
R-30 Cassavaugh
R-31 AShline
R-32 OKusky
R-33 Anderson
R-34 Farrell
R-35 Huckins
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-40 Stone
R-41 Stevens
R-42 Pulsifer
R-43 Wild Forest
R-43 Wild Forest
R-44 Wild Forest
R-45 Wild Forest
R-46 Wild Forest

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Ma
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Boundary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- Recptor - Wild Forest
- Residential Recptor
- Sound Level Monitoring Locations

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

Scale 1' = 1000'

FIGURE - 2 SITE MAP



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APA EPS Letter 3

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November 28, 2022

Michael Polacco
Project Geologist H2H Geoscience Engineering, PLLC
1749 River Street
Troy, NY 12180

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Michael Polacco:

Thank you for the recent submissions describing the revised scope of work to perform a sound analysis in relation to APA Project No. 2021-0276, received on November 9 and 16, 2022.

Based on review of the submitted materials, to provide an accurate representation of noise levels at the nearest off-site receptors, please re-locate M-3 to be near the Mitchell residence labelled as R-21. In addition, please re-locate M-4 to the northeast corner of the Wild Forest parcel labeled as R-44.

If you have any questions regarding this letter or the project review process, please contact me at the phone number listed below.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

cc: Michael Hopmeier, Unconventional Concepts, Inc.
Matthew D. Norfolk, Esq.
William H. Kissel, Esq.
Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

3rd NIPA Responses

1900

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: February 28, 2023

APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Applicant: Unconventional Concepts, Inc.
Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Response To Third Notice of Incomplete Permit Application

THIRD NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on May 12, 2022. The submission provided important information in response to the Agency's January 13, 2033 Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's December 6, 2021 and January 13, 2022 NIPAs, the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the NIPAs was not submitted and is required to review the application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

June 6, 2022
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

cc: Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to Frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. **January 13, 2022 NIPA Item 1:** The submitted site plan titled, "Map of Survey Showing Certain Features of Lands of Pulsifer Logging LLC to be leased to "Diversified Upstate Enterprises LLC," prepared by John Deming, PLS and dated April 14, 2022, does not indicate the proposed boundaries of the lot to be leased and does not indicate the proposed size, just a cleared area labeled as "Shooting Range". Utilizing the scale provided within the PDF, the cleared area as measured along the limits of clearing is approximately 2.75 acres in size. Please confirm whether this is the proposed lease area size.

   Response: After discussions with Agency Staff, the applicant, Unconventional Concepts, Inc. ("UCI"), will not be entering into a lease with the property owner, Pulsifer Logging LLC ("PL"), for the Shooting Range area. PL shall maintain exclusive possession and ownership of the property as a whole. UCI shall have access to the area at certain times to perform ballistic testing in coordination with PL.

   In addition, an "edited copy of certified map" was provided that indicates a purple oval, not labeled, a yellow box labeled as "firing pad", and a green box labeled as "target area." Utilizing the scale provided with the PDF, the yellow box labeled "firing pad" is approximately 38 feet by 60 feet and the target area is located approximately 571 feet away and is approximately 52 feet by 61 feet in size. The original application materials indicated that the firing pad was to be constructed of a 100-foot by 100-foot crushed stone pad. Please clarify if the proposal has been revised to reduce the lease area and firing pad area with no crushed stone imported to the site.

   Response: Crushed stone will be used. The purpose of the crushed stone, which is identical to that currently used throughout the property for road and platform repair, will be placed for the same purpose as it is currently used, which is to stabilize the terrain and reduce erosion. The use of crushed stone is a common practice throughout the region to stabilize the terrain and reduce erosion.

   As noted in previous submissions, the specific placement of instrumentation and test articles will vary within a general range based on test requirements. All instrumentation and test articles are portable and will be emplaced before and after each test. As no permanent structures will be deployed, exact position of placement may vary each time.

Please clarify and revise the professionally prepared site plan map to indicate the lease area boundaries, the location of any proposed safety signage, and the size and the location and dimensions of the firing pad and target area accordingly.

Response: As stated above, there will be no lease. Signage location was discussed with Agency Staff at last meeting.

In addition, please clarify what the purple oval represents.

Response: The purple oval is the "control operations area." The label was inadvertently left off the referenced map previously submitted. A corrected copy of the map is provided in Appendix A attached hereto.

In addition, the site plan indicates that the proposed lease is to Diversified Upstate Enterprises, LLC. The application and prior responses have come from Michael Hopmeier and Unconventional Concepts, Inc. Please clarify the relationship between Diversified Upstate Enterprises and Unconventional Concepts Inc. and provide signatures from the principals involved with Diversified Upstate Enterprises, LLC as necessary.

Response: As stated above there will be no lease. Diversified Upstate Enterprises, LLC is a wholly owned subsidiary of UCI. Mr. Hopmeier is the principal for both entities.

2. **January 13, 2022 NIPA Item 4**: Noise assessment details included in the submission received May 12, 2022 conflict with what was previously submitted and further clarification is necessary. For instance, the provided response materials state that "(B)ased on recommendation from the APA, further research on the noise source was performed. Based on that research, the actual noise source is assumed to be 166.1 dB." The provided response materials do not clarify how this revised noise source estimate of 166.1 dB was determined, how the previously presented noise source of 185 dB was in error or, for example, whether a different cannon or munition is being proposed to be tested resulting in different source noise levels. Absent a detailed explanation regarding this significant reduction of 19 dB in noise source, the provided noise assessment is unsupported. Most notably, the provided noise assessment indicates that the equipment being tested is a M109A5/6; Paladin, 155mm self-propelled Howitzer firing M4A2 zone 7 charges, however the provided footnote reference to a link of a PDF of 2006 Noise Levels of Common Army Equipment by USACHHPM indicates that the location of the 166.1 dB noise measurement is from "in fighting compartment with hatches open except drivers," which is not representative of a worst case scenario of a maximum noise intensity emitted open air with no armored tank walls or other sound mitigation barriers in place. Please address these discrepancies.

Response: *See* Sound Study prepared by H2H Geoscience Engineering, PLLC submitted to the Agency in early February of 2023 ("Sound Study 2023").

The materials received May 12, 2022 do not adequately address the January 13, 2022 NIPA Item 4 with respect to providing a more complete noise assessment report, including a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0 mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Road and State Land classified as Wild Forest.

Response: *See* Sound Study 2023.

The provided noise assessment only evaluates the nearest off-site residential receptor dwelling as the Pulsifer residence near the sawmill, but this submission indicates that the dwelling is located 0.96 miles east of the noise source, where the previous submission materials indicated that it's located 1.22 miles from the source. Please clarify whether the firing pad location has changed and provide an accompanying street address for this nearest receptor. Please also provide the distance of the noise receptor from the existing enclosed sawmill and include an estimate of vegetated buffer from the sawmill to this receptor and any other nearby receptors of the sawmill as further discussed below.

Response: *See* Sound Study 2023.

The provided noise assessment indicates that "the estimated background/ambient noise level during the day at the proposed test site is 80 dB(A)," but also indicates that the proposed firing pad is to be located approximately 1 mile (0.96 mi) from the sawmill as detailed above. Please reconcile. The provided noise assessment indicates that the estimated background/ambient noise level during the day at the nearest receptor of the Pulsifer Residence is also 80 dBa. Please note that the referenced commercial use site is subject to Agency Permit 1991-0170, which authorized the expansion of an existing sawmill and wood using facility. As described in project description 6h and project impact 17a of 1991-0170, the facility design was intended to control and reduce noise, including concrete block/sand fitted walls, roofed structure with hanging commercial noise absorbing baffles for the debarker, with bark blown directly into a closed box trailer; full enclosure of the main sawmill with a semi-permanent solid wall on the east end removed only for equipment installation and repair; sawdust will be blown directly into a closed box trailer; chipper installed inside a concrete block, roofed structure with chips blown directly into a closed box trailer; dowel mill machinery to be fully enclosed in mill building with baffles and log barriers used to reduce noise. Without accounting for the noise mitigation measures in place at the enclosed sawmill, in addition to the distance from the residential dwelling to the enclosed sawmill, and absent noise meter readings, the estimated ambient noise level of 80 dBa is unsupported.

Response: *See* Sound Study 2023.

Please clarify whether there are tanks or other armored machinery now proposed to be utilized on-site and provide and evaluate the corresponding sound pressure levels in a revised noise assessment.

Response: All vehicles and equipment used on site will not exceed current noise levels created by equipment commonly used in the area. For example, skidders, logging transport trucks, chainsaws, and chippers are all used by area landowners for various applications. Vehicles and on-site equipment of any type used at the proposed testing range will not exceed current generated noise levels. *See also* Sound Study 2023.

The noise assessment materials received by the Agency on May 12, 2022, appear to be prepared by Unconventional Concepts, Inc. and do not include a professional stamp on the submission materials. The preparer of any revisions submitted to address the items above must be a NYS licensed professional familiar with NYSDEC's Program policy Assessing and Mitigating Noise Impacts (ny.gov).

Response: *See* Sound Study 2023.

January 13, 2022 NIPA Item 5: The provided response states that no additional sound pressure level reduction methods are proposed. Based on the information provided regarding potential sound impacts, this is inadequate. As detailed in NYSDEC's noise policy, the addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65dB(A).

Response: *See* Sound Study 2023.

As the provided ambient noise level of 80 dBa is unsupported and needs to be revised per NYSDEC's noise policy, please provide an accompanying noise mitigation plan that includes sound pressure level reduction methods and also addresses the following:

- The materials indicate that for personnel within proximity to the site, hearing protection will be provided. Please specify what this minimum specific hearing protection safety distance is from the firing pad location.

Response: *See* Sound Study 2023.

- The materials indicate the Town Supervisor of the Town of Lewis will coordinate with local Emergency Management Services to notify any citizens in close proximity to the test range of the test schedule, by phone or e-mail, 72 hours prior to the testing and again 24 hours prior to testing. Please provide documentation of the agreement with the Town of Lewis that they are responsible for notification. Additionally, please define "close proximity" to the test range.

196 **Response: The protocol for providing the public notification of testing will be**

similar to that employed by NYCO Minerals for its mining operations in the Town of Lewis. No later than 10 days prior to any testing, the range safety officer will provide the public affairs coordinator with a schedule of the upcoming testing. The schedule will include the approximate times and the duration of testing. Seven days prior to any testing, the public affairs coordinator will contact the Town of Lewis and provide it with the testing schedule. The Town may publish the notice as it deems appropriate. Emergency Management Services will also be notified in case it receives 911 calls reporting activity at the site. UCI will obtain the names of the owners of the surrounding properties within a two-mile radius from public records maintained by the Town of Lewis and mail the owners notice of the testing seven days prior to the testing. There is no written agreement with the Town of Lewis.

The minimum specific hearing protection safety distance is 250 ft. from the firing pad.

UCI's considers 100 ft. to be in close proximity.

Please note that, based upon the application materials submitted to date, the proposal as presented consists of testing munitions year-round up to 120 times per year with an estimated munitions firing noise source of 185 dB with no noise source mitigation measures proposed. The U.S. Department of the Army considers any impulse noise greater than 140 dB hazardous and requires their employees to wear hearing protection. In addition, the US Bureau of Mining research has documented damage to residential

dwelling window glass from over air pressure blasts of greater than 133 dB with the federal standard 30 CFR § 816.67 set at 133 dB on over air blasts associated with mining activities. Accordingly, based on potential noise impacts alone, absent revisions to the project proposal, the project <u>does not meet the criteria for issuance of a permit under Agency law.</u>

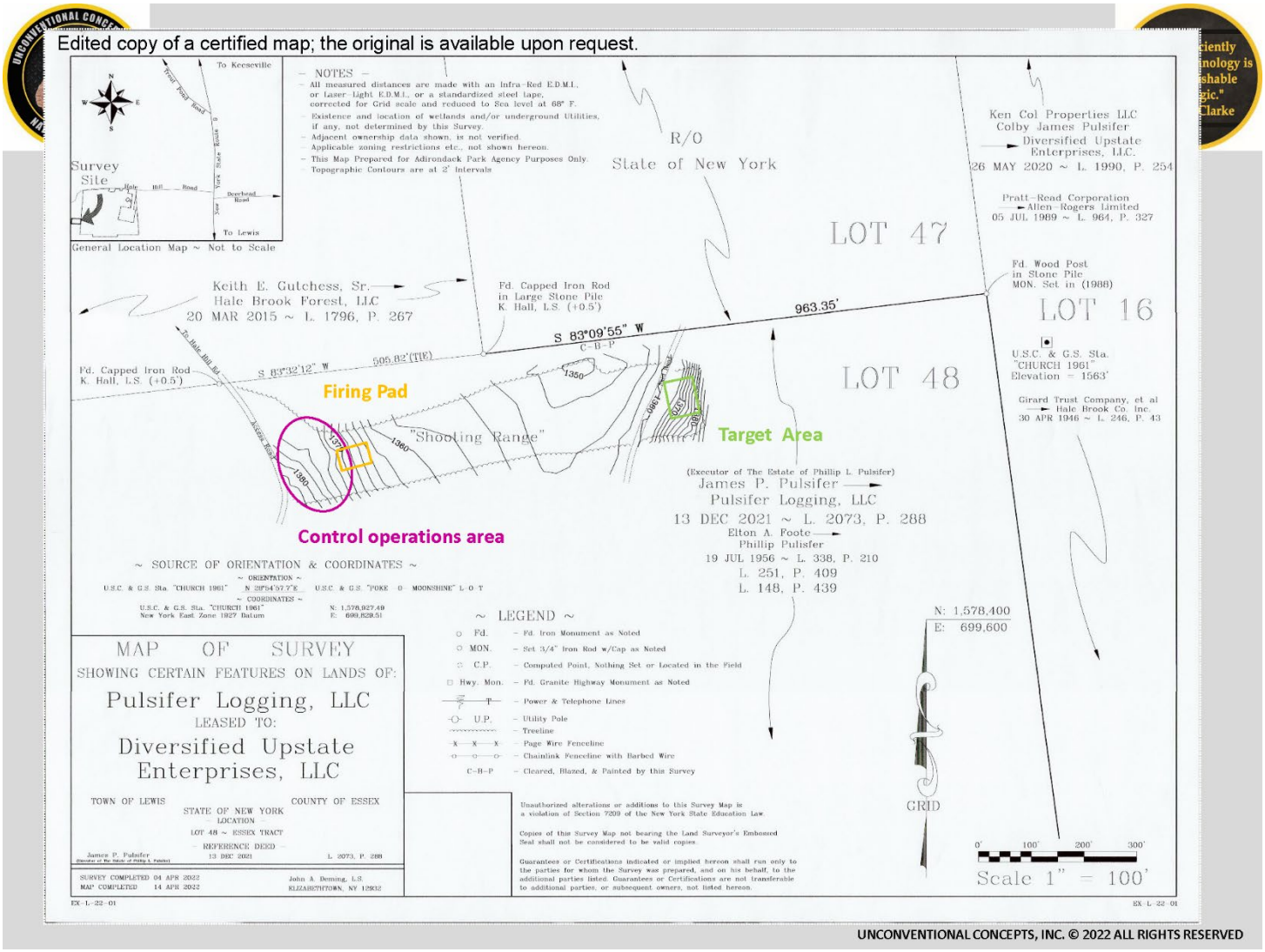
Response: There is no basis at this stage of the application process for Agency Staff to come to the underscored conclusion that the project does not meet the criteria for issuance of a permit "based on the potential noise impacts alone" or otherwise. It is apparent from the Third Notice of Incomplete Application that Agency Staff members, themselves, believe more information is needed to properly review and assess UCI's project application. The precipitous conclusion that the application will be denied is a cause for concern that Agency Staff may be straying from the rational and logical model of decision making embodied in Agency regulations to a predisposed decision making model where decisions are made based on personal preferences and opinions regardless of the data and whether or not the decision is actually right.

APPENDIX A
Site plan with additional areas of interest highlighted and labeled

Purple oval: control operations area

Orange: firing pad (approximately 100 ft x 100 ft; surface will be crushed stone)

Green: target area



Note: This is copy of the original site plan, with additional comments noted in color. The original plan was prepared by a surveyor licensed in the state of NY and is to scale.

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H2H February 2023 Sound Study

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SOUND STUDY

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: March 1, 2023

UNCONVENTIONAL CONCEPTS, INC.

APA PROJECT #2021-0276

Prepared for:
Unconventional Concepts, Inc.
620 Herndon Parkway, Suite 120A
Herndon, VA 20170

Prepared by:

H2H Geoscience Engineering, PLLC
179 River Street
Troy, New York 12180
(518) 270-1620
www.h2hg-e.com

February 2023

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1.0 INTRODUCTION

Unconventional Concepts, Inc. (UCI) has proposed to the Adirondack Park Agency (APA), an application for the operation of a projectile testing range in Lewis, New York. The range (Site) is at 195 Hale Hill Lane (Figure 1). H2H Geoscience Engineering, PLLC (H2H) prepared this report to identify and evaluate the potential impacts of off-site sound propagation from the proposed application. The potential sound impacts associated with the application were assessed in accordance with the requirements set forth by the Adirondack Park Agency (APA) and the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT BACKGROUND

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. The range will be developed to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance.

This effort will focus on the test and evaluation of these new systems in support of a critical US Army research program managed by Benét Laboratories at Watervliet Arsenal in Albany, NY. The project will focus on the instrumentation and firing of these systems in a constrained area to allow for measurement and assessment of the internal ballistics and kinetic and kinematic effects of these modern designs.

All test equipment and instrumentation will be portable; equipment will be deployed as needed to the Site for a test and will then be completely removed at the end of the test. No more than three tests per month are anticipated. Each test will consist of four-five shots, and each series of shots will last no more than two days. Testing will only occur on weekdays, between 10:00 AM and 4:00 PM local time. No more than two shots will be fired in one day. These tests are anticipated to continue for a period of 5 years, with an average of no more than 30 shots per year.

The Site is on land owned by Pulsifer Logging, LLC (38.1-1-31.000). UCI is using the land with the landowner's (written) permission. The Sound Source (system being tested) will be located on a 100 ft. X 100 ft. crushed gravel pad (Firing Pad). The Operations Control Area is adjacent to the Firing Pad; the Target Area is 590 ft. east of the Firing Pad (Figure 2).

The Site is accessed via an access road off Hale Hill Road. The area surrounding the Site is heavily forested with a topographic high to the east and south. NYS Route 9 is located approximately 7,000 ft. to the east. Within a two-mile radius of the site (Project Area) forty-two Residential Receptors (RR) were identified. The closest RR is the Pulsifer residents (R-1) 5,200 ft. to the northeast off Hale Hill Road. Five parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius (Figure 1).

H2H developed a Scope of Work (SOW) approved by the APA specifying the locations sound level monitoring was conducted. The SOW incorporating the APA's November 28, 2022 comments on the location of Monitoring location M-3 and M-4 is attached as Appendix E.

3.0 SOUND LEVEL MONITORING

Sound level monitoring was conducted by H2H on December 20, 2022, and December 21, 2022. Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Site to best determine ambient sound level conditions in the Project Area (Figure 1).

3.1 ENVIRONMENTAL CONDITIONS

Weather data was collected from a weather station located at The Silo (Figure 1).

3.1.1 December 20, 2022

During the study period, the weather conditions included temperatures between 27 °F and 31 °F, winds out of the south between zero and six miles per hour, 70% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.1.2 December 21, 2022

During the study period, the weather conditions included temperatures between 23 °F and 32 °F, winds out of the southwest between zero and four miles per hour, 75% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.2 MONITORING EQUIPMENT

Sound level measurements were recorded using calibrated Casella CEL-633 ANSI or Quest SoundPro DL-2-1/3 sound level meters. Each monitor was set to log A-weighted, fast response, at one-second intervals. Each Casella monitor was programed to record audio to aid in identifying sound sources. Each unit was field calibrated before each monitoring event; each unit was also laboratory-qualified, technician calibrated (Appendix B). Each meter was tripod mounted at an approximate height of 5 feet, microphones were covered with windscreens. Monitors were outfitted with external batteries.

3.3 MONITORING LOCATION SOUND LEVELS

Sound levels were collected as discussed in Section 3.2 at each monitoring location during 10:00 a.m. – 4:00 p.m. (proposed testing hours). Sound level data was cleaned to remove anomalous sound sources, and data outside monitoring periods. Staffed sound level monitoring was conducted at each monitoring location to log the relative loudness, and the types of sounds that could be heard at each monitoring location. Photos of each monitoring location are provided in appendix B.

3.3.1 Monitoring Location M-1 –

Monitoring location M-1 is adjacent to Residential Receptor R-1 on Hale Hill Road at elevation 705 ft. amsl. 5,800 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-1 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-1 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Heavy truck traffic on Hale Hill Rd. to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –

- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 81.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 56.7 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Heavy truck traffic to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –

- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 27.5 to 83.0 dBA.
- The average equivalent continuous sound level (L_{eq}) was 57.2 dBA

3.3.2 Monitoring Location M-2 -

Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surrounding Pulsifer Rd.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 24.8 to 70.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 42.5 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –
- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 25.0 to 70.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.8 dBA

3.3.3 Monitoring Location M-3

Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9,

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.2 to 82.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 59.6 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9,

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 86.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 61.2 dBA

3.3.4 Monitoring Location M-4

Monitoring Location M-4 is southwest of the Firing Pad next to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 18.1 to 70.7 dBA.
- The average equivalent continuous sound level (L_{eq}) was 39.1 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.5 to 71.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.9 dBA.

3.3.5 Monitoring Location M-5

Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and

- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.6 to 65.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 37.2 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.8 to 58.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 34.7 dBA.

4.0 MODEL RESULTS

4.1 SOUND PROROGATION MODEL

A sound propagation model was developed for the area within a two-mile radius of the Firing Pad using the International Standards Organization ISO 9613 -1,2,3 standards applied in the dBmap.net noise mapping tool. The model accounts for surface reflection and absorption, atmospheric absorption, geometric divergence, weather conditions, topography, and source sound power level.

The model assumes moderate downwind propagation, and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and Sound Source height of 6.5 feet is used. Appendix D summaries model input data.

The Sound Source being modeled is a field howitzer of the type M109A3GN (155mm). This field howitzer model is typical for its type and would represent the noisiest field howitzer tested on Site. The sound level data for the Sound Source is provided in a study conducted by the Norwegian Defense Estates Agency (Appendix E). Sound Levels were measured at 820 ft. from the muzzle of the howitzer in the direction of fire. Sound levels used for the Sound Source are from Sensor 1, (closest to direction of fire) sound levels are shown in Table E.2 of Appendix E. The modeled scenario shows the M109A3GN firing from the Firing Pad (only location Sound Source will be operated) as shown on Figure 2.

The sound propagation model shows the modeled impulse sound level produced by the Sound Source; the duration of the impulse sound level is approximately 4 milliseconds. Model results are shown in Figure 3. Sound levels are A-weighted and shown in the form of isolines in 5 dB intervals from 45 dB(A) to 130 dB(A). Modeled sound levels at each monitoring location are labeled.

4.2 EFFECT ON AMBIENT SOUND LEVELS

To measure the effect the modeled impulse sound (shot fired from the howitzer) would have on ambient sound levels within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. The $L_{eq,\ 1\text{-}sec}$ recorded sound levels were exported to allow each $L_{eq,\ 1\text{-}sec}$ sound level over the monitoring period (10:00

a.m. to 4:00 p.m.) to be viewed individually. To measure how impulse sound levels would affect the ambient sound level at each monitoring location the modeled impulse sound level (Figure 3) at each monitoring location is input into the ambient data for that monitoring location. This was done twice to model the effect of two impulse sound levels (two shots per day). The results of each modeled scenario are compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

Table 1a: Tuesday, December 20, 2022, Modeled Sound Level Summary Table

Tuesday, December 20, 2022				
Monitoring Location	**Recorded Ambient dBA Leq**	**Modeled Impulse sound level dBA**	**Modeled Ambient dBA Leq**	**Change from Recorded Ambient**
M-1	57.2	75	57.2	0
M-2	42.5	71	42.8	0.3
M-3	59.6	73	59.6	0
M-4	39.1	79	41.9	2.8
M-5	37.2	107	66.7	29.5

Table 1b: Wednesday, December 21, 2022, Modeled Sound Level Summary Table

Wednesday, December 21, 2022				
Monitoring Location	**Recorded Ambient dBA Leq**	**Modeled Impulse sound level dBA**	**Modeled Ambient dBA Leq**	**Change from Recorded Ambient**
M-1	56.7	75	56.8	0.1
M-2	40.8	71	41.2	0.4
M-3	61.2	73	61.2	0
M-4	40.9	79	42.9	2.0
M-5	34.7	107	66.7	32.0

5.0 SUMMARY & CONCLUSIONS

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. Testing will only occur on weekdays, between the hours of 10:00 a.m. and 4:00 p.m. No more than two shots will be fired in one day. Forty- two residential receptors, and five parcels of NYS Land identified as Wild Forest fall within the Project Area (Figure 1). Sound level monitoring was conducted at five monitoring locations on December 20, 2022, and December 21, 2022, to determine ambient sound levels within the Project Area.

A sound propagation model was developed to evaluate the impulse sound level produced by the Sound Source within the Project Area (Figure 3). The effect of the modeled impulse sound level on ambient sound levels from each monitoring location is discussed in Section 4.2 and summarized in Table 1.

The modeled change in ambient sound level is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors. No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-43) adjacent to the Firing Pad (Figure 2 & 3) shows a modeled impulse sound level of 107 dB(A), and a modeled ambient sound level of 66.7 dB(A) a 32.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

There are no identified public trails on or means of public access to R-43. In reviewing surrounding land uses three currently permitted hard rock mining operations exist within a 2.1-mile radius of the Site. Hard rock mining operations require regular blasting as part of their weekly operations, under the mines NYSDEC Mine Land Reclamation Permit an air blast limit of 133 dB measured to the closest structure outside the permit area is permitted. 133 dB is 26 dB above the modeled sound level of 107 dB(A) at R-43. In addition, one of the currently permitted mining operations is adjacent to lands classified as Wilderness. Lands classified as Wilderness are considered to be less impacted by human use than lands classified as State Forest.

Based on the information presented in this report the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area.

FIGURES

FIGURE 1 –SITE OVERVIEW MAP

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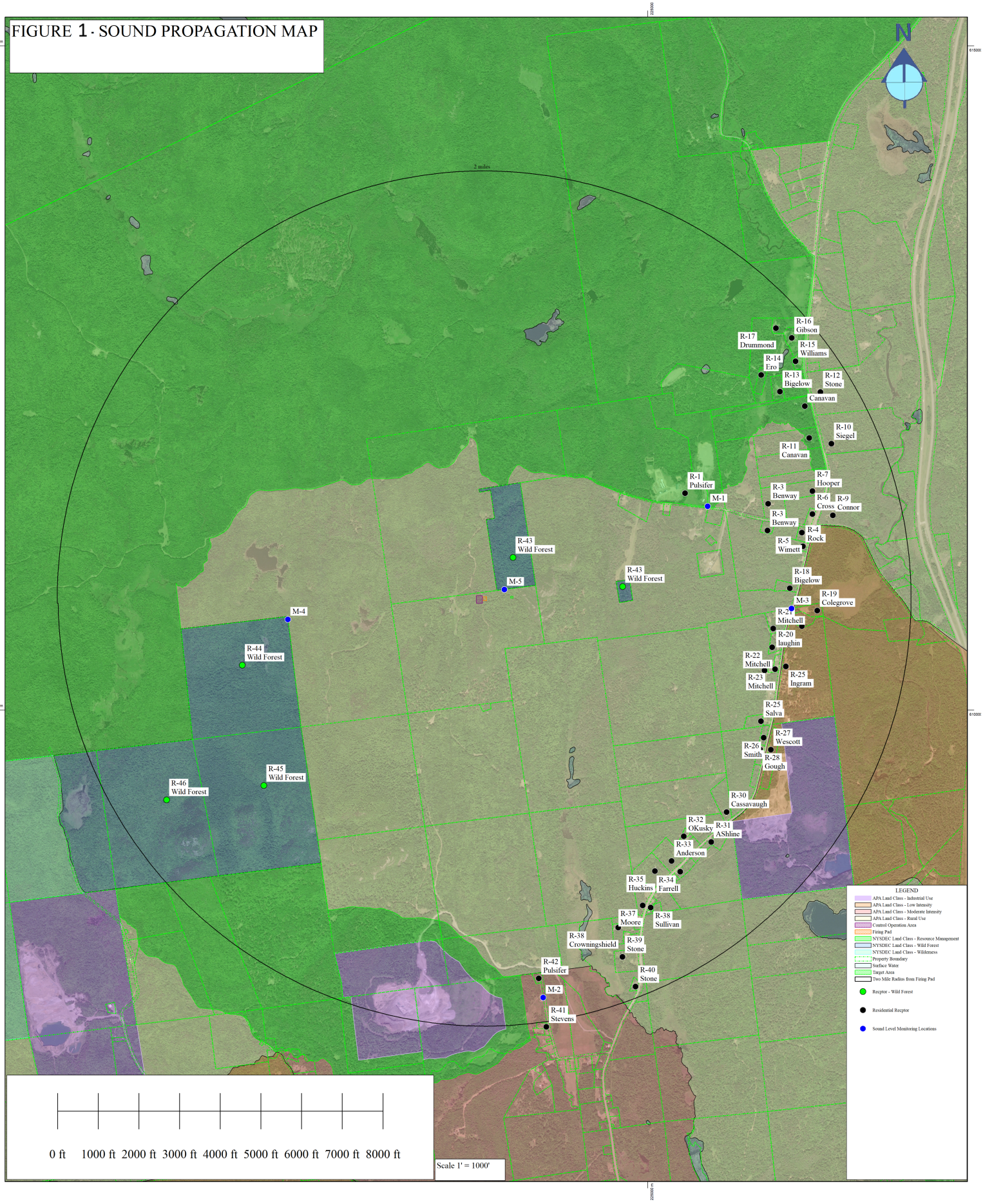
FIGURE 1 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
M-1
R-7 Hooper
R-3 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
R-43 Wild Forest
M-5
R-18 Bigelow
M-3
R-19 Colegrove
R-21 Mitchell
R-20 laughin
R-22 Mitchell
R-23 Mitchell
R-25 Ingram
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
M-4
R-44 Wild Forest
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-40 Stone
R-42 Pulsifer
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Recptor - Wild Forest
Residential Recptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1' = 1000'

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FIGURE 2 – SITE MAP

FIGURE - 2 SITE MAP



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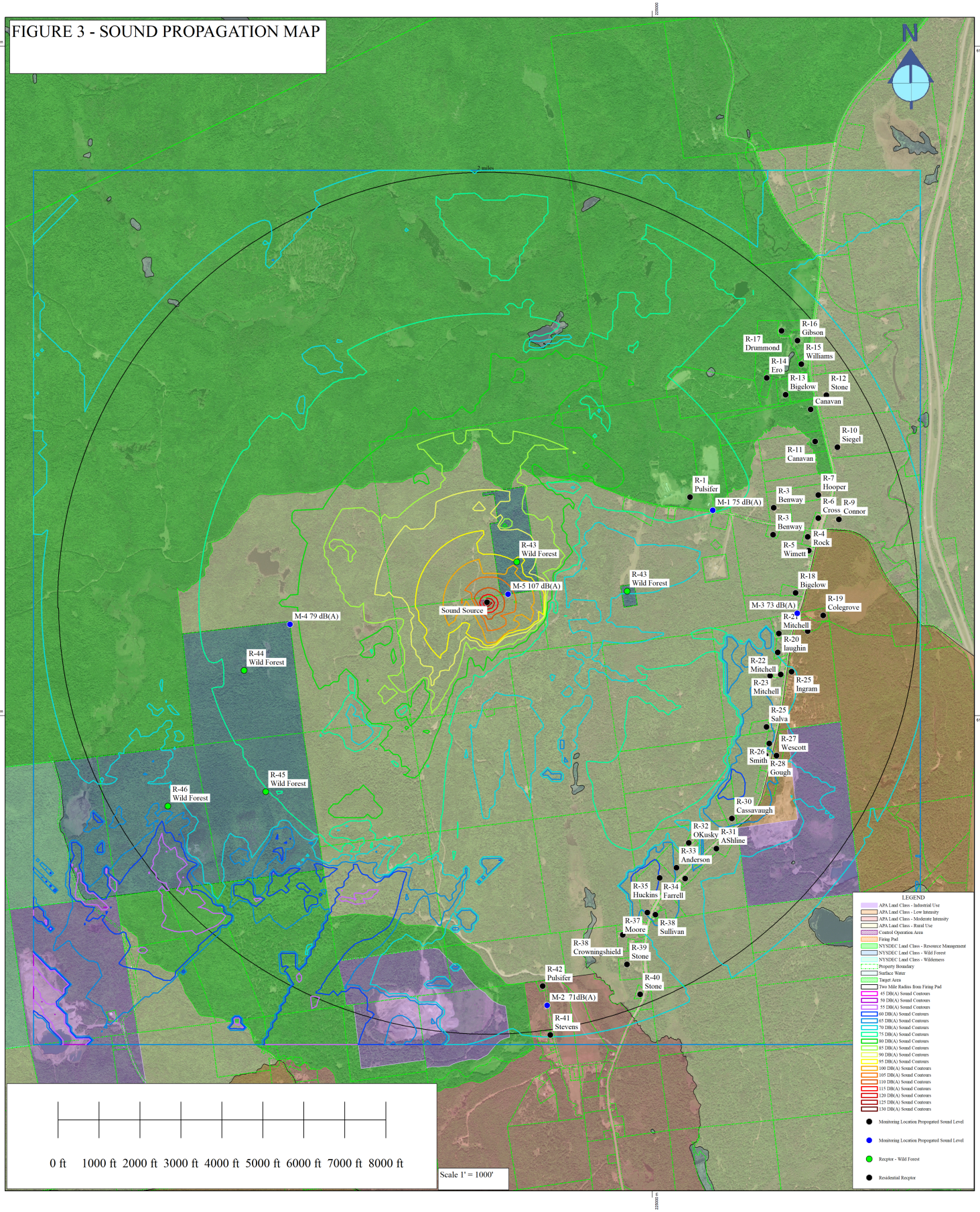
FIGURE 3 – SOUND PROPAGATION MAP

FIGURE 3 - SOUND PROPAGATION MAP



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APPENDICES

APPENDIX A –
NYSDEC – ASSESSING AND MITIGATING NOISE IMPACTS

Assessing and Mitigating Noise Impacts

New York State
Department of Environmental Conservation

PROGRAM POLICY	**Department ID: DEP-00-1**	**Program ID: n/a**
Issuing Authority: Environmental Conservation Law Articles 3, 8, 23, 27 Name: Jeffrey Sama Title: Director Signature: /S/ Date: 10/6/00 Issuance Date: October 6, 2000 Revised: February 2, 2001	**Originating Unit: Division of Environmental Permits** Office/Division: Environmental Permits Unit: Phone: (518) 402-9167 Latest Review Date (Office Use):	

Abstract: Facility operations regulated by the Department of Environmental Conservation located in close proximity to other land uses can produce sound that creates significant noise impacts for proximal sound receptors. This policy and guidance presents noise impact assessment methods, examines the circumstances under which sound creates significant noise impacts, and identifies avoidance and mitigative measures to reduce or eliminate noise impacts.

Related References: See references pages 27 and 28.

I. PURPOSE[1]

This policy is intended to provide direction to the staff of the Department of Environmental Conservation for the evaluation of sound levels and characteristics (such as pitch and duration) generated from proposed or existing facilities. This guidance also serves to identify when noise levels may cause a significant environmental impact and gives methods for noise impact assessment, avoidance, and reduction measures. These methods can serve as a reference to applicants preparing environmental assessments in support of an application for a permit. Additionally, this guidance explains the Department's regulatory authority for undertaking noise evaluations and for imposing conditions for noise mitigation measures in the agency's approval

[1] A Program Policy Memorandum is designed to provide guidance and clarify program issues for Division staff to ensure compliance with statutory and regulatory requirements. It provides assistance to New York State Department of Environmental Conservation (DEC) staff and the regulated community in interpreting and applying regulations and statutes to assure that program uniformity is attained throughout the State. Nothing set forth in a Program Policy Memorandum prevents DEC staff from varying from that guidance as specific circumstances may dictate, provided the staff's actions comply with applicable statutory and regulatory requirements. As this guidance document is not a fixed rule, it does not create any enforceable right by any party using the Program Policy Memorandum.

of permits for various types of facilities pursuant to regulatory program regulations and the State Environmental Quality Review Act (SEQR).

II. BACKGROUND

Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by proposed or existing facilities may become noise due to land use surrounding the facility. When lands adjoining an existing or proposed facility contain residential, commercial, institutional or recreational uses that are proximal to the facility, noise is likely to be a matter of concern to residents or users of adjacent lands.

A. Sources of Noise Generation

The three major categories of noise sources associated with facilities are (1) fixed equipment or process operations; (2) mobile equipment or process operations; and (3) transport movements of products, raw material or waste. The fixed plant may include a very wide range of equipment including: generators; pumps; compressors; crushers of plastics, stone or metal; grinders; screens; conveyers; storage bins; or electrical equipment. Mobile operations may include: drilling; haulage; pug mills; mobile treatment units; and service operations. Transport movements may include truck traffic within the operation, loading and unloading trucks and movement in and out of the facility. Any or all of these activities may be in operation at any one time. Singular or multiple effects of sound generation from these operations may constitute a potential source of noise.

B. Potential for Adverse Impacts

Numerous environmental factors determine the level or perceptibility of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; time of day; wind direction; temperature gradient; and relative humidity. The characteristics of a sound are also

important determining factors for considering it as noise. The amplitude (loudness), frequency (pitch), impulse patterns and duration of sound all affect the potential for a sound to be a noise. The combination of sound characteristics, environmental factors and the physical and mental sensitivity of a receptor to a sound determine whether or not a sound will be perceived as a noise. This guidance uses these factors in assessing the presence of noise and the significance of its impacts. It relies upon qualitative and quantitative sound evaluation techniques and sound pressure level impact modeling presented in accepted references on the subject.

C. Mitigation

Mitigation refers to actions that will be taken to reduce the effects of noise or the noise levels on a receptor. Adverse noise effects generated by a facility can be avoided or reduced at the point of generation thereby diminishing the effects of the noise at the point of reception. This guidance identifies various mitigation techniques and their proper application either at the source of noise generation or on a facility's property. Alternative construction or operational methods, equipment maintenance, selection of alternative equipment, physical barriers, siting of activities, set backs, and established hours of construction or operation, are among the techniques that can successfully avoid or reduce adverse noise effects.

D. Decision Making

When an assessment of the potential for adverse noise impacts indicates the need for noise mitigation, it is preferred that specifications for such measures be incorporated in a noise analysis and in the applicant's work or operational plan necessary for a complete application. Presenting a plan that incorporates effective noise mitigation provisions facilitates the Department's technical and environmental review and minimizes or negates the imposition of permit conditions by the Department. Adherence to these plans becomes a condition of a permit.

Noise avoidance and mitigation measures may also be imposed directly as conditions of permit issuance. This guidance will review the statutory authority under which the Department can require the mitigation of noise effects.

III. POLICY

In the review of an application for a permit, the Department of Environmental Conservation is to evaluate the potential for adverse impacts of sound generated and emanating to receptors outside of the facility or property. When a sound level evaluation indicates that receptors may experience sound levels or characteristics that produce significant noise impacts or impairment of property use, the Department is to require the permittee or applicant to employ reasonable and necessary measures to either eliminate or mitigate adverse noise effects. Options to be used to fulfill this guidance should be implemented within the existing regulatory and environmental review framework of the agency.

Regulatory authority for assessing and controlling noise effects are contained in both SEQR and specific Department program regulations. Specific regulatory references are as follows:

Section 3-0301(1)(i) of the Environmental Conservation Law (ECL) states that the commissioner shall have the power to: "i. Provide for prevention and abatement of all water, land and air pollution including but not limited to that related to particulates, gases, dust, vapors, noise, radiation, odor, nutrients and heated liquids."

To comply with Article 8 of the ECL and 6 NYCRR Part 617, State Environmental Quality Review Act, consideration of all relevant environmental issues must be undertaken in making a determination of environmental significance. Noise impact potential is one of many potential issues for consideration in a SEQR review.

Environmental Conservation Law (ECL) Article 23, Title 27, Mined Land Reclamation Law (MLRL), requires applicants for permits to prepare and submit a mined land use plan to the Department for approval. The plan must describe, "the applicant's mining method and measures

to be taken to minimize adverse environmental impacts resulting from the mining operation." The provisions to be incorporated in a Mined Land Use Plan, as specified in 6 NYCRR Section 422.2, include the control of noise as a component of the plan.

The solid waste regulations at 6 NYCRR Subdivision 360-1.14(p), establish A-weighted decibel levels that are not to be exceeded at the property line of a facility.

The Division of Air Resources has regulations in 6 NYCRR Parts 450 through 454 that regulate the allowable sound level limits on certain motor vehicles. The statutory authority for these regulations is found in the New York State Vehicle and Traffic Law, Article 10, Section 386.

This guidance does not supercede any local noise ordinances or regulations.

IV. RESPONSIBILITY

The environmental analyst, acting as project manager for the review of applications for permits or permit modifications and working in concert with the program specialist, is responsible for ensuring that sound generation and noise emanating from proposed or existing facilities are properly evaluated. For new permits or significantly modified permits, there should be a determination as to the potential for noise impacts, and establishment of the requirements for noise impact assessment to be included in the application for permit. Where the Department is lead agency, the analyst is responsible for making a determination of significance pursuant to SEQR with respect to potential noise impacts and include documentation for such determination.

Where impacts are to be avoided or reduced through mitigation measures, the analyst, or where there are program requirements to address noise, the program specialist, should determine the effectiveness and feasibility of those measures and ensure that the permit conditions contain specific details for such measures. It should also be determined if additional measures to control noise are to be imposed as a condition of permitting. Appropriate permit language for the permit conditions should be developed by the program specialist and the analyst. The results of noise impact evaluations and the effectiveness of mitigation measures

shall be incorporated into SEQR documents and, where necessary, permit conditions shall be placed in final permits to ensure effective noise control.

When it is determined that potential noise effects, as well as other issues, warrant evaluation of impacts and mitigation measures in a Draft Environmental Impact Statement (EIS) prepared pursuant to SEQR, the environmental analyst with the Division of Environmental Permits assumes responsibility for determining the level of evaluation needed to assess sound level generation, noise effects, and mitigation needs and feasibility.

For existing facilities, the program specialist will determine the need for additional mitigation measures to control noise effects either in response to complaints or other changes in circumstances such as new noise from existing facilities or a change in land-use proximal to the facility.

The applicant or their agent, in preparing an application for a permit and supporting documentation, is responsible for assessing the potential noise impacts on area receptors. When potential adverse noise impacts are identified, the applicant should incorporate noise avoidance and reduction measures in the construction or operating plans. The applicant's submittal should also assess the effectiveness of proposed mitigation measures in eliminating adverse noise reception. Where noise effects are determined to be a reason in support of a SEQR positive declaration, the applicant shall assess noise impacts, avoidance, and mitigation measures in a Draft EIS using methodologies acceptable to this Department.

V. PROCEDURE

The intent of this section is to: introduce terms related to noise analyses; describe some of the various methods used to determine the impacts of sound pressure levels on receptors; identify some of the various attenuators of noise; and list some of the mitigative techniques that can be used to reduce the effects of noise on a receptor. At the end of the section three levels of analysis are described. The first level determines the potential for adverse noise impacts based on noise characteristics and sound pressure increases solely on noise attenuation over distance between the source and receptor of the noise. The second level factors other considerations such as topography and noise abatement measures in determining if adverse

noise impacts will occur. The third level evaluates noise abatement alternatives and their effectiveness in avoiding or reducing noise impacts.

The environmental effects of sound and human perceptions of sound can be described in terms of four characteristics:

1. Sound Pressure Level (SPL may also be designated by the symbol L_p) or perceived loudness is expressed in decibels (dB) or A-weighted decibel scale dB(A) which is weighted towards those portions of the frequency spectrum, between 20 and 20,000 Hertz, to which the human ear is most sensitive. Both measure sound pressure in the atmosphere.

2. Frequency (perceived as pitch), the rate at which a sound source vibrates or makes the air vibrate.

3. Duration i.e., recurring fluctuation in sound pressure or tone at an interval; sharp or startling noise at recurring interval; the temporal nature (continuous vs. intermittent) of sound.

4. Pure tone which is comprised of a single frequency. Pure tones are relatively rare in nature but, if they do occur, they can be extremely annoying.

Another term, related to the average of the sound energy over time, is the Equivalent Sound Level or $L_{eq.}$ The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent Sound Level is considered to be directly related to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time. By its derivation L_{eq} does not express the maximum nor minimum SPLs that may occur in a given time period. These maximum and minimum SPLs should be given in the noise analysis. The time interval over which the L_{eq} is measured should always be given. It is generally shown as a parenthetic; $L_{eq\,(8)}$ would indicate that the sound had been measured for a period of eight hours.

Equivalent Sound Level (L_{eq}) correlates well and can be combined with other types of noise analyses such as Composite Noise Rating, Community Noise Equivalent Level and day-night noise levels characterized by L_{dn} where an $L_{eq(24)}$ is measured and 10 dBA is added to all noise levels measured between 10 pm and 7 am. These different types of noise analyses

basically combine noise measurements into measures of cumulative noise exposure and may weight noise occurring at different times by adding decibels to the actual decibel level. Some of these analyses require more complex noise analysis than is mentioned in this guidance. They may be used in a noise analyses prepared for projects.

Designations for sound levels may also be shown as $L_{(10)}$ or $L_{(90)}$ in a noise analysis. These designations refer to the sound pressure level (SPL) that is exceeded for 10% of the time over which the sound is measured, in the case of $L_{(10)}$, and 90% of the time, in the case of $L_{(90)}$. For example, an $L_{(90)}$ of 70 dB(A) means that 70 dB(A) is exceeded for 90% the time for which the measurement was taken.

A. Environmental Setting and Effects on Noise Levels

1. Sound Level Reduction Over Distance - It is important to have an understanding of the way noise decreases with distance. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, SPL changes in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dB reduction in the sound. Therefore, a sound level of 70 dB at 50 feet would have a sound level of approximately 64 dB at 100 feet. At 200 feet sound from the same source would be perceived at a level of approximately 58 dB.

2. Additive Effects of Multiple Sound Sources - The total sound pressure created by multiple sound sources does not create a mathematical additive effect. Below Table A is given to assist you in calculating combined noise sources. For instance, two proximal noise sources that are 70 dBA each do not have a combined noise level of 140 dBA. In this case the combined noise level is 73 dBA. Since the difference between the two sound levels is 0 dB, Table A tells us to add 3 dB to the sound level to compensate for the additive effects of the sound. To find the cumulative SPL assess the SPLs starting with the two lowest readings and work up to the difference between the two highest readings. For several pieces of equipment, operating at one

time, calculate the difference first between the two lowest SPLs, check Table A and add the appropriate number of decibels to the higher of the two sound levels. Next, take the sound level that was calculated using Table A and subtract the next lowest sound level to be considered for the operation. Consult Table A again for the additive effect and add this to the higher of the two sound levels. Follow this process until all the sound levels are accounted for. As an example, let us say that an area for a new facility is being cleared. The equipment to be used is: two chainsaws, one operating at 57 dBA and one at 60 dBA; a front end loader at 80 dBA; and a truck at 78 dBA. Start with the two lowest sound levels: 60 dBA - 57 dBA = 3 dBA difference. Consulting the chart add 2 dBA to the higher sound level. The cumulative SPL of the two chainsaws is 62 dBA. Next, subtract 62 dBA from 78 dBA. 78 dBA - 62 dBA = 16 dBA. In this case, 0 dBA is added to the higher level so we end up with 78 dBA. Lastly, subtract 78 dBA from the 80 dBA. 80 dBA - 78 dBA = 2 dBA a difference of 2 dBA adds 2 dBA to the higher SPL or 82 dBA. The SPL from these four pieces of equipment operating simultaneously is 82 dBA.

Table A

Approximate Addition of Sound Levels

Difference Between Two Sound Levels	Add to the Higher of the Two Sound Levels
1 dB or less	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0 dB

(USEPA, Protective Noise Levels, 1978)

3. Temperature and Humidity - Sound energy is absorbed in the air as a function of temperature, humidity and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. Such attenuation is short term and, since it occurs over a great distance, should not be considered in calculations. Higher temperatures tend to increase sound velocity but does

not have an effect on the SPL. Sound waves bend towards cooler temperatures. Temperature inversions may cause temporary problems when cooler air is next to the earth allowing for more distant propagation of sound. Similarly, sound waves will bend towards water when it is cooler than the air and bounce along the highly reflective surface. Consequently large water bodies between the sound source and the receptor may affect noise attenuation over distance.

4. Time of Year - Summer time noises have the greatest potential for causing annoyance because of open windows, outside activities, etc. During the winter people tend to spend more time indoors and have the windows closed. In general, building walls and windows that are closed provide a 15 dB reduction in noise levels. Building walls with the windows open allow for only a 5 dB reduction in SPL.

5. Wind - Wind can further reduce the sound heard at a distance if the receptor is upwind of the sound. The action of the wind disperses the sound waves reducing the SPLs upwind. While it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experienced at the same distance without a wind. This dispels the common belief that sound levels are increased downwind due to wind carrying noise.

6. Land forms and structures - In certain circumstances, sound levels can be accentuated or focused by certain features to cause adverse noise impacts at specified locations. At a hard rock mine, curved quarry walls may have the potential to cause an amphitheater effect while straight cliffs and quarry walls may cause an echo. Buildings that line streets in cities can cause a canyon effect where sound can be reflected from the building surfaces similar to what might happen in a canyon. Consideration of noise impacts associated with these types of conditions may require specialized expertise to evaluate impact potential and to formulate suitable mitigation techniques.

Consideration of existing noise sources and sound receptors in proximity to a proposed activity can be important considerations even when the activity under review is not a noise source. Topography, vegetation, structures and the relative location of noise receptors and sources to these features are all aspects of the environmental setting that can influence noise impact potential. As such, land alteration may also indirectly create an adverse noise impact where natural land features or manmade features serve as a noise barrier or provide noise attenuation for existing sources of noise, i.e. highway, railroads, manufacturing activity. Removal of these features, i.e. hills, vegetation, large structures or walls, can expose receptors to increased sound pressure levels causing noise problems where none had previously existed.

B. Impact Assessment

1. Factors to Consider

Factors to consider in determining the impact of noise on humans, are as follows:

a. Evaluation of Sound Characteristics

(1) Ambient noise level - A noise can only intrude if it differs in character or SPL from the normal ambient sound. Most objective attempts to assess nuisance noise adopt the technique of comparing the noise with actual ambient sound levels or with some derived criterion.

(2) Future noise level - The ambient noise level plus the noise level from the new or proposed source.

(3) Increase In Sound Pressure Level - A significant factor in determining the annoyance of a noise is Sound Pressure Level (SPL). SPLs are measured in decibels.

(4) Sharp and Startling Noise - These high frequency and high intensity noises can be extremely annoying. When initially evaluating the effects

of noise from an operation, pay particular attention to noises that can be particularly annoying. One such noise is the back-up beepers required to be used on machinery. They definitely catch one's attention as they were meant to do. Continual beeping by machinery can be mitigated (see Section V.C. Mitigation - Best Management Practices). Another impulse noise source that can be very annoying is the exhaust from compressed air machinery. This exhaust is usually released in loud bursts. Compressed air exhaust can also be mitigated if it causes a noise problem by using readily available mufflers or specifically designed enclosures.

(5) Frequency and Tone - Frequency is the rate at which a sound source vibrates or makes the air vibrate. Frequency is measured in Hertz (Hz). Frequency can also be classified as high ("sharp"), low ("dull"), and moderate. Pure tones are rare in nature. Tonal sounds usually consist of pure tones at several frequencies. Pure tones and tonal sounds are discerned more readily by the human ear. Pure tones and tonal sounds are compensated for in sound studies by adding a calculated number of dB(A) to the measured sound pressure.

(6) Percentile of Sound Levels - Fluctuations of SPLs can be expressed as a percentile level designated as $L_{(n)}$ where a given decibel level is exceeded *n* % of the time. A designation of $L_{(10)}$ = 70 dBA means the measured SPLs exceeded 70 dBA 10% of the time. A designation of $L_{(90)}$ = 70 dBA means the measured SPLs were exceeded 90% of the time. $L_{(90)}$ is often used to designate the background noise level.

(7) Expression of Overall Sound - Part of the overall assessment of sound is the *Equivalent Sound Level* (L_{eq}) which assigns a single value of sound level for a period of time in which varying levels of sound are experienced over that time period. The L_{eq} value provides an indication of the effects of sound on people. It is also useful in establishing the ambient sound levels at a potential noise source.

In order to evaluate the above factors in the appropriate context, one must identify the following: 1) appropriate receptor locations for sound level calculation or measurement; 2) ambient sound levels and characteristics at these receptor locations; and 3) the sound pressure increase and characteristics of the sound that represents a significant noise effect at a receptor location.

b. Receptor Locations

Appropriate receptor locations may be either at the property line of the parcel on which the facility is located or at the location of use or inhabitance on adjacent property. The solid waste regulations require the measurements of sound levels be at the property line. The most conservative approach utilizes the property line. The property line should be the point of reference when adjacent land use is proximal to the property line. Reference points at other locations on adjacent properties can be chosen after determining that existing property usage between the property line and the reference point would not be impaired by noise, i.e., property uses are relatively remote from the property line. The location of the facility should be shown on a map in relation to each potential receptor. Any future expansion should be described in a narrative as well as depicted on a map. The map and narrative should also include the distance of the operation to each point of reception including the distance at the point in time when an expanding operation will be closest to the receptors.

c. Thresholds for Significant Sound Pressure Level (SPL) Increase

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on

existing SPLs and the character of surrounding land use and receptors. SPL increases approaching 10 dB result in a perceived doubling of SPL. The perceived doubling of the SPL results from the fact that SPLs are measured on a logarithmic scale. An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases. The above thresholds as indicators of impact potential should be viewed as guidelines subject to adjustment as appropriate for the specific circumstances one encounters.

Establishing a maximum SPL at the point of reception can be an appropriate approach to addressing potential adverse noise impacts. Noise thresholds are established for solid waste management facilities in the Department's Solid Waste regulations, 6 NYCRR Part 360. Most humans find a sound level of 60 - 70 dB(A) as beginning to create a condition of significant noise effect (EPA 550/9-79-100, November 1978). In general, the EPA's "Protective Noise Levels" guidance found that ambient noise levels # 55 dBA $L_{(dn)}$ was sufficient to protect public health and welfare and, in most cases, did not create an annoyance (EPA 550/9-79-100, November 1978). In non-industrial settings the SPL should probably not exceed ambient noise by more than 6 dB(A) at the receptor. An increase of 6 dB(A) may cause complaints. There may be occasions where an increase in SPLs of greater than 6 dB(A) might be acceptable. The addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dB(A). This would be considered the "upper end" limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet. Some outdoor activities can be conducted at a SPL of 65 dB(A). Still lower ambient noise levels may be necessary if there are sensitive receptors nearby. These goals can be attained by using the mitigative techniques outlined in this guidance.

Ambient noise SPLs in industrial or commercial areas may exceed 65 dB(A) with a high end of approximately 79 dB(A) (EPA 550/9-79-100, November 1979). In these instances mitigative measures utilizing best management practices should be used in an effort to ensure that a facility's generated sound levels are at a minimum. The goal in an industrial/commercial area, where ambient SPLs are already at a high level, should be not to exceed the ambient SPL. Remember, if a new source

operates at the same noise level as the ambient, then 3 dB(A) must be added to the existing ambient noise level to obtain the future noise level. If the goal is not to raise the future noise levels the new facility would have to operate at 10 dB(A) or more lower than the ambient.(see Table A)

Table B

HUMAN REACTION TO INCREASES IN SOUND PRESSURE LEVEL

Increase in Sound Pressure (dB)	Human Reaction
Under 5	Unnoticed to tolerable
5 - 10	Intrusive
10 - 15	Very noticeable
15 - 20	Objectionable
Over 20	Very objectionable to intolerable

(Down and Stocks - 1978)

Impact assessment will vary for specific project reviews, but must consist of certain basic components for all assessments. Additional examination of sound generation and noise reception are necessary, where circumstances warrant. Sound impact evaluation is an incremental process, with four potential outcomes:

- exemption criteria are met and no noise evaluation is required;
- noise impacts are determined to be non-significant (after first-level evaluation);
- noise impacts are identified as a potential issue but can be readily mitigated (after second level evaluation); or
- noise impacts are identified as a significant issue requiring analysis of alternatives as well as mitigation (third level evaluation).

All levels of evaluation may require preparation of a noise analysis. The required scope of noise impact analysis can be rudimentary to rather sophisticated, depending on circumstances and the results obtained from initial levels of evaluation. Recommendations for each level of evaluation are presented below.

2. Situations in Which No Noise Evaluation is Necessary

When certain criteria are satisfied, the need for undertaking a noise impact analysis at any level is eliminated. These criteria are as follows:

a. The site is contained within an area in which local zoning provides for the intended use as a "right of use". It does not apply to activities that are permissible only after an applicant is granted a special use permit by the local government; and

b. The applicant's operational plan incorporates appropriate best management practices (BMPs [see Section V.C. Mitigation - Best Management Practices]) for noise control for all facets of the operation.

Where activities may be undertaken as a "right of use", it is presumed that noise has been addressed in establishing the zoning. Any residual noise that is present following BMP implementation should be considered an inherent component of the activity that has been found acceptable in consideration of the zoning designation of the site.

3. First Level Noise Impact Evaluation

The initial evaluation for most facilities should determine the maximum amount of sound created at a single point in time by multiple activities for the proposed project. All facets of the construction and operation that produce noise should be included such as land clearing activities (chain saw and equipment operation), drilling, equipment operation for excavating, hauling or conveying materials, pile driving, steel work, material processing, product storage and removal. Land clearing and construction may be only temporary noise at the site whereas the ongoing operation of a facility would be considered permanent noise. An analysis may be required for

various phases of the construction and operation of the project to assure that adverse noise effects do not occur at any phase.

To calculate the sound generated by equipment operation, one can consult the manufacturers' specifications for sound generation, available for various types of equipment. Another option for calculating the sound to be generated by equipment is to make actual measurements of sound generated by existing similar equipment, elsewhere.

Tables C and D summarize noise measurements from some common equipment used in construction and mining. Table E summarizes the noise level, in decibels (dB[A]), from some common sources. This information can be used to assist Department staff in relating potential noise impacts to sound levels produced by commercial and industrial activities. Use of these tables in the first level of analysis will help determine whether or not noise will be an issue and whether actual measurements should be made to confirm noise levels.

Table C

PROJECTED NOISE LEVELS

Noise Source	Measurements	1,000 feet	2,000 feet	3,000 feet
Primary and secondary crusher	89 dB(A) at 100 ft	69.0 dB(A)	63.0 dB(A)	59.5 dB(A)
Hitachi 501 shovel loading	92 dB(A) at 50 ft	66.0 dB(A)	60.0 dB(A)	56.5 dB(A)
Euclid R-50 pit truck loaded	90 dB(A) at 50 ft	64.0 dB(A)	58.0 dB(A)	54.4 dB(A)
Caterpillar 988 loader	80 dB(A) at 300 ft	69.5 dB(A)	63.5 dB(A)	60.0 dB(A)

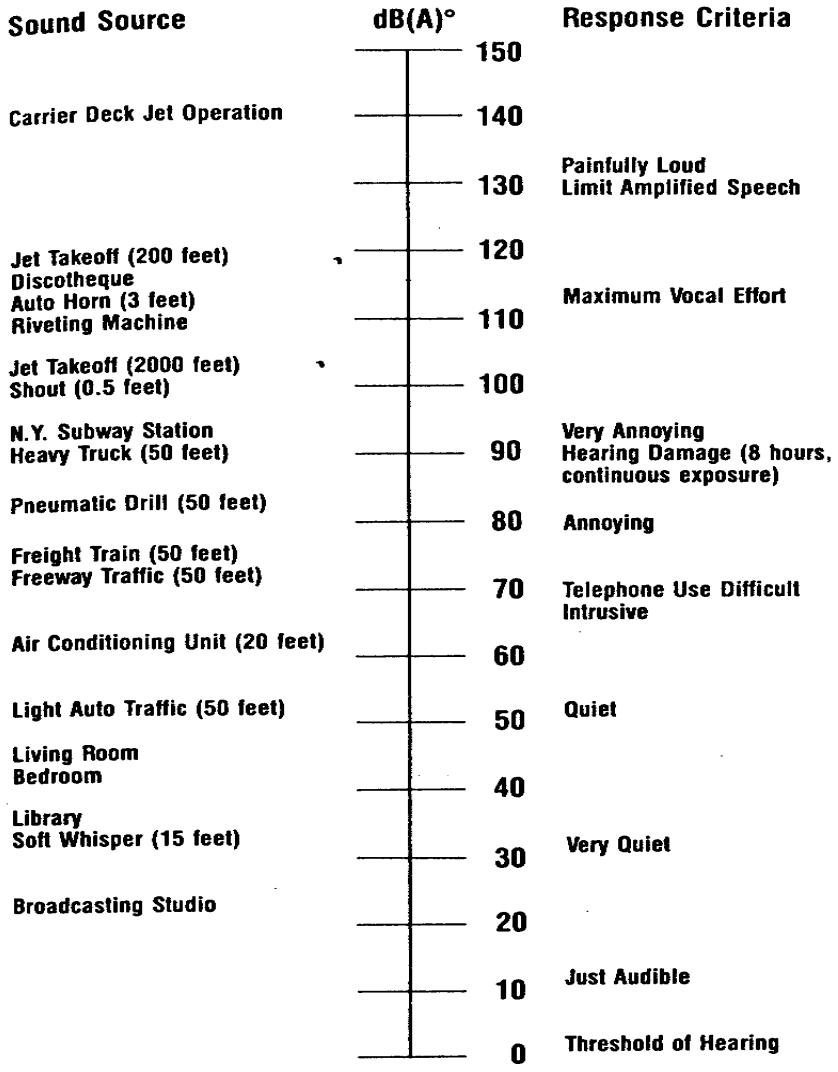
(The Aggregate Handbook, 1991)

Table D
Common Equipment Sound Levels

EQUIPMENT	**DECIBEL LEVEL**	**DISTANCE** in feet
Augered earth drill	80	50
Backhoe	83-86	50
Cement mixer	63-71	50
Chain saw cutting trees	75-81	50
Compressor	67	50
Garbage Truck	71-83	50
Jackhammer	82	50
Paving breaker	82	50
Wood Chipper	89	50
Bulldozer	80	50
Grader	85	50
Truck	91	50
Generator	78	50
Rock drill	98	50

(excerpt and derived from Cowan, 1994)

Table E



(The Aggregate Handbook, 1991)

The sound level at receptor locations should be calculated using the inverse square rule whereby sound is attenuated over distance. Again, each doubling of the distance from the source of a noise decreases the SPL by 6 dB(A) at distances greater than 50 feet. This calculation should first consider the straight line distance between the point of noise generation and the point of noise reception with the presumption that no natural or manmade features exist along the transect between the two points that would further attenuate sound level. Calculations should be performed for each point of reception in all directions being careful to evaluate the worst case noise impact potential by considering activities at the point where they would be closest to a receptor. The sound level calculated for the point of reception should be related to ambient sound levels. Ambient sound levels can be either measured or assumed based on established references for the environmental setting and land use at the point of reception. For estimation purposes, ambient SPLs will vary from approximately 35 dB(A) in a wilderness area to approximately 87 dB(A) in a highly industrial setting. A quiet seemingly serene setting such as rural farm land will be at the lower end of the scale at about 45 dB(A), whereas an urban industrial area will be at the high end of this scale at around 79 dB(A) (EPA 550/9-79-100, November 1978). If there is any concern that levels based on reference values do not accurately reflect ambient SPL, field measurements should be undertaken to determine ambient SPLs.

Where this evaluation indicates that sound levels at the point of reception will not be perceptible, similar to or only slightly elevated as compared to ambient conditions, no further evaluation is required. When there is an indication from this initial analysis that marginal or significant noise impact may occur, further evaluation is required. In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive. (see B.1.a Evaluation of Sound Characteristics)

4. Second Level Noise Impact Evaluation

Further refine the evaluation of noise impact potential by factoring in any additional noise attenuation that will be provided by existing natural topography, fabricated structures such as buildings, walls or berms or vegetation located between the point of noise generation and noise reception. This analysis may require consideration of future conditions and the loss of natural noise buffers over time.

Dense vegetation that is at least 100 feet in depth will reduce the sound levels by 3 to 7 dB(A). Evergreens provide a better vegetative screen than deciduous trees. Keep in mind that if a vegetative screen does not currently exist, planting a vegetative screen may require 15 or more years of growth before it becomes effective.

The degree to which topography attenuates noise depends on how close the feature is located to the source or the receptor of the noise. Topography can act as a natural screen. The closer a hill or other barrier is to the noise source or the receptor, the larger the sound shadow will be on the side opposite the noise source. Certain operations such as mining and landfills may be able to use topography to maintain a screen between the operation and receptors as they progress. Mining operations may be able to create screens by opening a mine in the center of the site using and maintaining the pit walls as barriers against sound (Aggregate Handbook, 1991).

If after taking into account all the attenuating features the potential still exists for adverse noise impact, other types of noise analyses or modeling should be used to characterize the source. An Equivalent Sound Level (L_{eq}) analysis or a related type of noise analysis may better define activities or sources that require more mitigation or isolation so that noise emanating from these sources will not cause an adverse impact.

Where it is demonstrated that noise absorbing or deflecting features further attenuate sound reception to a level of no significant increase, no further analysis is necessary. Where it is determined that noise level or the character of the noise may

have a significant adverse effect on receptors, other noise mitigation measures should be evaluated in an expanded noise analysis.

5. Third Level - Mitigation Measures

When the above analyses indicate significant noise effects may or will occur, the applicant should evaluate options for implementation of mitigation measures that avoid, or diminish significant noise effects to acceptable levels (see Section V.C. Mitigation - Best Management Practices). Adequate details concerning mitigation measures and an evaluation of the effectiveness of the mitigative measures through additional sound level calculations should be provided in a noise analysis. These calculations are to factor in the noise reduction or avoidance capabilities of the mitigation measures. In circumstances where noise effects cannot readily be reduced to a level of no significance by project design or operational features in the application, the applicant must evaluate alternatives and mitigation measures in an environmental impact statement to avoid or reduce impacts to the maximum extent practicable per the requirements of the State Environmental Quality Review Act (SEQR).

The noise analysis should be part of the application or a supplement to it, and will be part of the SEQR environmental assessment by reference. Duplicative noise analysis information is not required for the permit application and the assessment of impacts under SEQR. A proper analysis can satisfy information needs for both purposes.

C. Mitigation - Best Management Practices (BMP) for Reducing Noise

Various noise abatement techniques are available for reducing frequency of sound, duration of sound or SPLs at receptor locations. The mitigation techniques given below are listed according to what sound characteristic they mitigate.

1. Reduce noise frequency and impulse noise at the source of generation by:

   a. Replacing back-up beepers on machinery with strobe lights (subject to other requirements, e.g., OSHA and Mine Safety and Health Administration, as applicable). This eliminates the most annoying impulse beeping;

   b. Using appropriate mufflers to reduce the frequency of sound on machinery that pulses, such as diesel engines and compressed air machinery;

   c. Changing equipment: using electric motors instead of compressed air driven machinery; using low speed fans in place of high speed fans;

   d. Modifying machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces; and

2. Reduce noise duration by:

   a. Limiting the number of days of operation, restricting the hours of operation and specifying the time of day and hours of access and egress can abate noise impacts.

   b. Limiting noisier operations to normal work day hours may reduce or eliminate complaints.

Limiting hours of construction or operation can be an effective tool in reducing potential adverse impacts of noise. The impacts of noise on receptors can be

significantly reduced by effectively managing the hours at which the loudest of the operations can take place.

Implementation of hours of operation does not reduce the SPL emanating from a facility. Determining whether or not hours of operation will be effective, mitigation requires consideration of: public safety, for example road construction at night may reduce traffic concerns and facilitate work; duration of the activity, is it a one time event necessary to meet a short term goal or will the activity become an ongoing operation; and surrounding land use, consider what type(s) of land use is proximal to the activity and at what time(s) might a reduction of noise levels be necessary. There may be other factors to consider due to the uniqueness of a given activity or the type of land use adjacent to the activity. Hours of operation should also consider weekend activities and legal holidays that may change the types of land use adjacent to the permitted activity or increase traffic levels in an area.

The best results from using hours of operation as a mitigative measure will be obtained if the hours are negotiated with the owner or operator of the facility. The less noisy aspects of an operation may not have to be subject to the requirements of hours of operation such as preparing, greasing and maintaining machinery for the upcoming day's operation. The more noisy operations can be scheduled to begin when people in the receptor area are less likely to be adversely effected. Hours of operation should be included in the operation plans for a facility that becomes part of the permit, or in the event that there is no operation plan, can be included as a permit condition.

3. Reduce Noise sound pressure levels by:

   a. Increasing the setback distance.
   b. Moving processing equipment during operation further from receptors.
   c. Substituting quieter equipment (example - replacing compressed air fan with an electric fan could result in a 20 dB reduction of noise level).

d. Using mufflers selected to match the type of equipment and air or gas flow on mechanical equipment.
e. Ensuring that equipment is regularly maintained.
f. Enclosing processing equipment in buildings (example - enclosing noisy equipment could result in an 8-10 dB noise level reduction, a 9 inch brick wall can reduce SPL by 45-50 dB).
g. Erecting sound barriers such as screens or berms around the noise generating equipment or near the point of reception. The angle of deflection also increases as the height of a screen or barrier increases. Screens or barriers should be located as close to the noise source or the receptor as possible. The closer the barrier is located to the source or the receptor, the greater the angle of deflection of the sound waves will be creating a larger "sound shadow" on the side opposite the barrier. Stockpiles of raw material or finished product can be an effective sound barrier if strategically placed.
h. phasing operations to preserve natural barriers as long as possible.
i. altering the direction, size, proximity of expanding operations.
j. Designing enclosed facilities to prevent or minimize an SPL increases above ambient levels. This would require a noise analysis and building designed by a qualified engineer that includes adequate ventilation with noise abatement systems on the ventilation system.

Public notification of upcoming loud events can also be used as a form of mitigation although it doesn't fit easily into the categories above. People are less likely to get upset if they know of an upcoming event and know that it will be temporary.

The applicant should demonstrate that the specific mitigation measures proposed will be effective in preventing adverse noise effects on receptors.

D. Decision Making - Conditioning Permits to Limit Noise Impacts

Preferably, the mitigation measures as outlined in the construction and operational plans should be relied upon to mitigate the effects of noise on receptors. The permit should state that the activity will be conducted in accordance with the approved plan. Otherwise, mitigation measures and BMP's can be imposed within specific permit conditions.

It is not the intention of this guidance to require decibel limits to be established for operations where such limits are not required by regulation. There are, however, instances when a decibel limit may be established for an operation to ensure activities do not create unacceptable noise effects, as follows:

1. The review of a draft and final environmental impact statement demonstrates the need for imposition of a decibel limit;
2. A decibel limit is established by the Commissioner's findings after a public hearing has been held on an application;
3. The applicant asks to have a decibel limit to demonstrate the ability to comply; or
4. A program division seeks to establish a decibel limit as a permit condition, when necessary to demonstrate avoidance of unacceptable noise impact.

Ultimately, the final decision must incorporate appropriate measures to minimize or avoid significant noise impacts, as required under SEQR. Any unavoidable adverse effects must be weighed along with other social and economic considerations in deciding whether to approve or deny a permit.

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Additional Reading

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APPENDIX B - INSTRUMENT CALIBRATION SHEETS

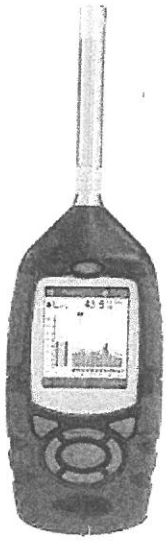
247

CASELLA

Certificate of Conformity and Calibration

FA05190

Instrument Type:-	**CEL-633C**
Serial Number	4210504
Firmware revision	V006-05
Microphone Type:-	**CEL-251**
Serial Number	05084
Preamplifier Type:-	**CEL-495**
Serial Number	005056
Instrument Class/Type:-	1



Applicable standards:-

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- *The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	**Test Engineer:-**	Nicola Cartwright
	32 %RH	**Date of Issue:-**	July 4, 2022
	1014 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

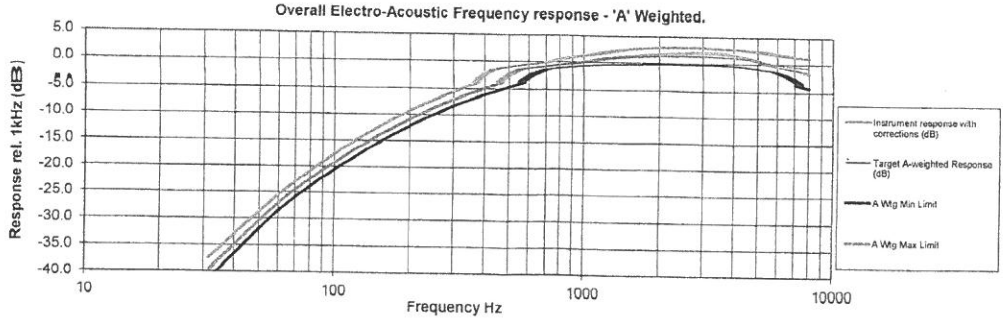
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - *A Weighted*

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 17320
Description Quest SoundPro DL-2-1/3
Calibrated 5/27/2022

Manufacturer Quest
Model Number SoundPro DL-2-1/3
Serial Number BIJ090026
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 40

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

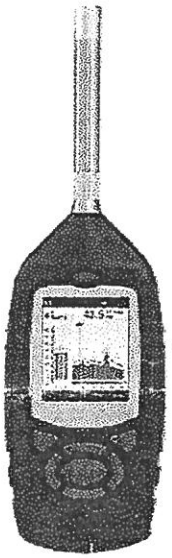
				(As Of Cal Entry Date)	
Test Instrument ID	**Description**	**Manufacturer**	**Serial Number**	**Last Cal Date**	**Next Cal Date**
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	0442231		
Firmware revision	V129-09		
Microphone Type:-	CEL-252	Preamplifier Type:-	CEL-495
Serial Number	89713	Serial Number	001775
Instrument Class/Type:-	2		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	Test Engineer:-	Paul Blackwell
	25 %RH	Date of Issue:-	December 22, 2021
	1015 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
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Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

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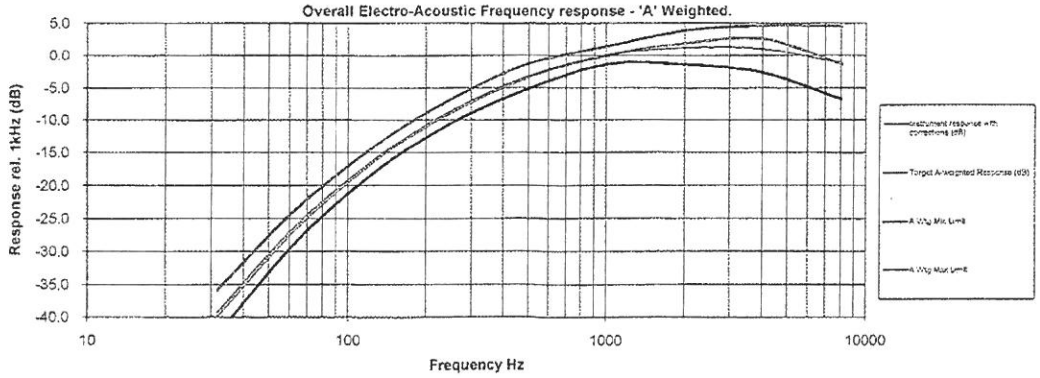

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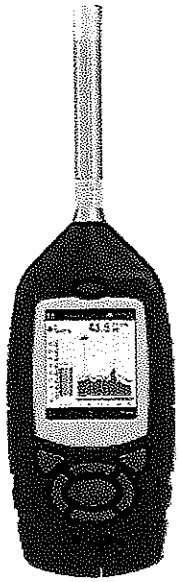
250

Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	4637949		
Firmware revision	V129-09		
Microphone Type:-	**CEL-252**	**Preamplifier Type:-**	**CEL-495**
Serial Number	60590	Serial Number	002125
Instrument Class/Type:-	**2**		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	23 °C	**Test Engineer:-**	Paul Blackwell
	33 %RH	**Date of Issue:-**	December 14, 2021
	1021 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

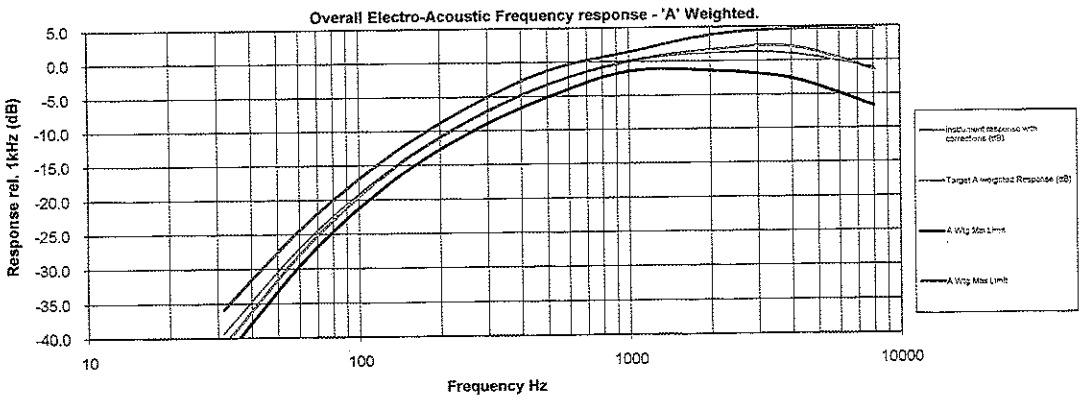
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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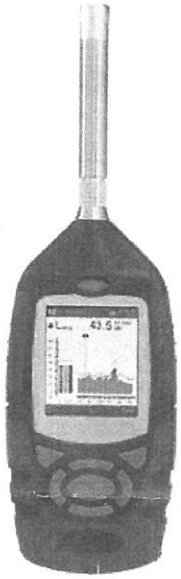
251

Certificate of Conformity and Calibration



Instrument Model:- CEL-633C

Serial Number 2145334
Firmware revision V129-09

Microphone Type:- CEL-251
Serial Number 5766

Preamplifier Type:- CEL-495
Serial Number 004239

Instrument Class/Type:- 1

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-

23 °C
29 %RH
999 mBar

Test Engineer:- Paul Blackwell
Date of Issue:- April 12, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

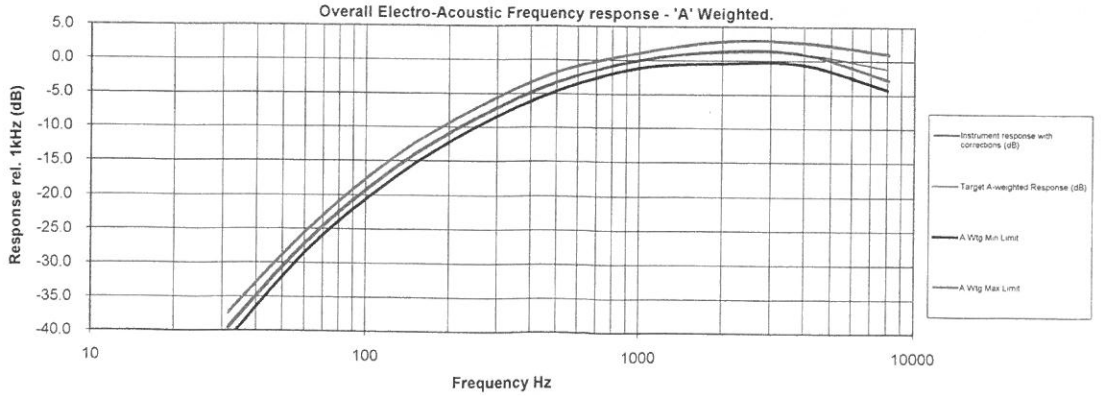
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-120/1
Serial Number:	5230919
Job Number:	25508
Date of Issue:	12-Apr-2022
Engineer:	P Blackwell

Traceable Equipment:		
	Reference Calibrator	EQ11085
	DVM type Fluke 45	EQ00318

Test Conditions:

Ambient Temperature	23.0	°C
Ambient Humidity	29.0	%RH
Ambient Pressure	999	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.04 dB	N/A dB	1.0000 kHz
Final Reading	114.00 dB	N/A dB	1.0000 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
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INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 5392
Description Quest QC-10 Acoustic Calibrator
Calibrated 5/26/2022

Manufacturer Quest
Model Number QC-10
Serial Number QID050172
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 35

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

APPENDIX C -
PHOTO LOG

Photo 1: M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad.



Photo 2: M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad.



Photo 3: M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad.



Photo 4: M-4 – Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad.



Photo 5: M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad.

APPENDIX D -
MODEL DATA

SOUND SOURCE

SOURCE	SOUND POWER LEVEL dBA	HEIGHT ABOVE GROUND (m)
M109A3GN (155 mm) Howitzer	176	2

MODEL CONFIGURATION

MODEL PARAMETER	SETTINGS
Atmospheric Absorption	20°C / 70% Humidity
Ground Absorption	0.7G Ground Factor
Receiver Height	1.5 meters for sound level isolines and receivers
Model Radius	3,218 m

MODELED SOUND LEVEL AT RECEIVERS

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	75	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	107	1.5

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APPENDIX E -
Noise emission data for M109, 155 mm field howitzer

https://www.ffi.no/no/Rapporter/07-02530.pdf

Noise emission data for M109, 155 mm field howitzer

Morten Huseby

Norwegian Defence Research Establishment (FFI)

5 December 2007

FFI-rapport 2007/02530

1034

ISBN 978-82-464-1300-6

Keywords

skytefelt

støy

haubits

måling

trykk

Approved by

Jan Ivar Botnan	Avdelingssjef/Director

English summary

This report is part of an effort to improve the ability of the Norwegian Defence Estates Agency to assess noise pollution from firing ranges. Here we analyze results from measurements done near Hjerkinn 21st of September 2006, of the 155 mm field howitzer, M109. M109 is one of the noisiest weapons in the Norwegian defence, and as such represents a limiting factor for activity at firing ranges and training fields.

MILSTØY II is the noise analysis code used by Norwegian Defence Estates Agency to estimate the noise level near military firing ranges and training fields. This code takes as input an emission database, containing the source level relatively close to the weapon. The emission data calculated in this report is presented on a form suitable to be included in the MILSTØY emission database.

Sammendrag

Denne rapporten er del av et arbeid for å forbedre Forsvarsbygg sin evne til å evaluere støynivået rundt skytefelt. Her utføres det en analyse av målinger som ble gjort nær Hjerkinn 21. september 2006, av 155 mm felt haubits, M109. M109 er et av de mest støyende våpnene i Forsvaret, og er dermed en begrensende faktor i forhold til aktiviteten på skytebaner og øvingsfelt.

MILSTØY II er Forsvarsbygg sitt verktøy for å berengne støynivået rundt Forsvarets skytebaner og øvingsfelt. Dette programmet tar som inngangsdata en emmisjonsdatabase, som innholder kildedata relativt nær våpenet. I denne rapporten presenteres det kildedata på en form som er egnet for å innkluderes i MILSTØY sin emmisjonsdatabase.

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1 Background

This report is part of work being conducted at the Norwegian Defence Research Establishment (FFI), to improve the ability of the Norwegian Defence Estates Agency (FB) to estimate noise pollution around military firing ranges. The noise level near firing ranges are subject to strict rules set by the authorities. Failure to comply with these rules will lead to limitations on the training activity.

The work conducted by FFI is part of a joint effort with FB as client. The project group consists of FFI, SINTEF IKT and NGI (Norwegian Geotechnical Institute). For a more comprehensive description of the activity of FFI in this field, we refer to [1, 2, 3, 4, 5, 6, 7, 8, 9, 10].

Currently FB use the linear propagation code MILSTØY II (MS) to calculate the noise propagation in the linear zone (Figure 1.1), where sound pressure is relatively small. MS use an emission database as input, giving source data at the start of the linear zone. There is a need to improve and expand this database. The data in the database are most often results of measurements. A rifle is typically measured 10 m from the muzzle. A large weapon may be measured at 250 m distance. In this report an analysis is presented to arrive at emission data for the M109A3GN, 155 mm field howitzer (Figure 2.1). This is one of the noisiest weapons in the Norwegian defence, and as such represents a limiting factor when planning firing ranges and training fields.

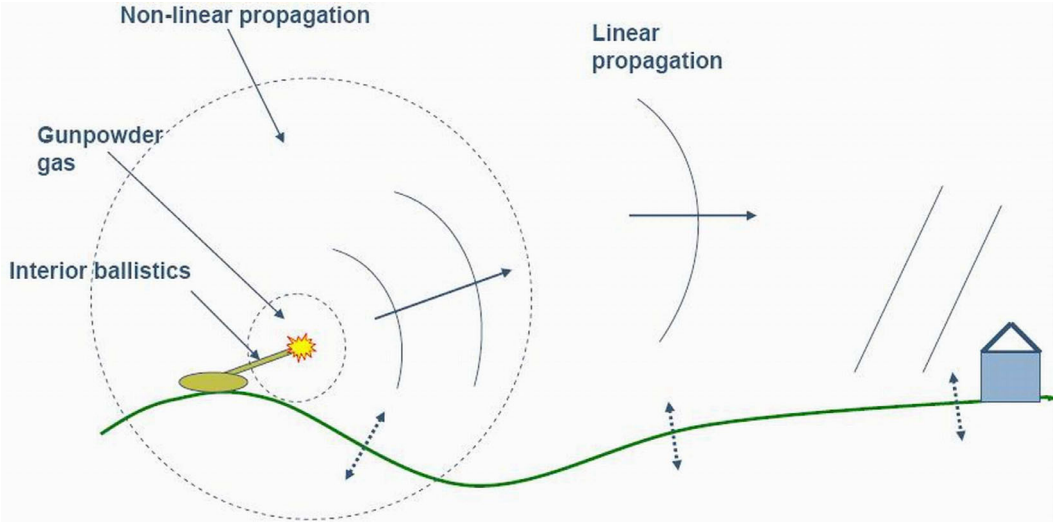


Figure 1.1: The different zones for sound propagation from a weapon.

2 Introduction

This report describes analysis and results of measurements of the M109 conducted at Hjerkinn 21st of September 2006. The details of the measurements are described in [11], and will not be reproduced in this report.

The measurements were made 250 m from the muzzle of the weapon. The M109 was placed at Turrhaugen just north of Dombås, and the target was at Hjerkinn training field, some 20 km north. The measurements were part of a large campaign, where the main purpose was to establish documentation of the properties of cargo ammunition.



Figure 2.1: M109

To produce free field emission data from large weapons close to the ground is not a trivial task. For small weapons several generally accepted methods exist to produce such data [12, 13]. To the author's knowledge, no such consensus has been reached for large weapons.

Noise propagation codes often take free field source data as input. This is motivated by the need to calculate the effect of different types of ground conditions along the propagation path. For a weapon like the M109 it is hard to imagine a setup where it is possible to measure the free field sound pressure. This means that free field source data have to be calculated from the sound pressure measured close to the ground. In this report this is done by first measuring a reference source to estimate the influence of the ground (and weather) for different frequencies. The reference source is 1 kg of TNT, for which we have data describing a free field detonation. Finally the resulting ground correction is added to the measured data for the M109, to produce the free field emission data.

In Section 3 the weapon and ammunition are described. Section 4 summarizes the sensor setup. In Section 5 we describe the calculation of the free field emission data. The results of this analysis are given in Appendix E, F and H.

3 Weapon and ammunition

The measured weapon was a field howitzer of the type M109A3GN (Figure 2.1). The howitzer used in these measurements is called Didrik (named after FFI's Didrik Cappelen). M109 is a 155 mm howitzer that is placed on an armored tracked vehicle.

The muzzle break has NATO number 1025–12–306–5557. It was made in Germany, has two chambers, and weighs 160 kg. The barrel has NATO number 1025–25–136–2638. It is 6045 mm long (39 cal.), maximum chamber pressure is 460 MPa and it weighs approximately 1600 kg. The NATO number of the complete vehicle is 2350–25-136-2496.

The charge was the maximum charge of 5 modules DM72. According to the supplier, each module contains 2.44 kg propelling charge [14, 15]. The measurements analyzed in this report are made with DM662 cargo grenades.

3.1 Calibration with 1 kg TNT

To establish a reference level, 1 kg TNT was detonated. Thursday 21st of September, 1 kg TNT was detonated at 09:38 (shot nr. 3) and at 16:23 (shot nr. 4).

It was not possible to move the M109, so the TNT could not be detonated at the position of the muzzle of the M109. The TNT was detonated about 35 m in front of the weapon, 1.5 m above the ground. The purpose of measuring the sound pressure from 1 kg TNT is to be able to remove the effect of the ground and the meteorology from the measurements for the M109.

4 Setup and measurement data

The setup at the measurement cite is described in detail in [11]. Some errors that have been found in [11] are reported in Appendix G. There were 12 sensors available in the measurements. The positions of these sensors, relative to the muzzle, are given in Table 4.1. In this report we will conduct an analysis based on the measurements at sensors 1–6. Results from sensor 10–12 for TNT are also considered, in order to asses the precision of the reference model for TNT.

In Table 4.1 angles are given between the firing direction and the direction from the muzzle to the sensor. The geometrical data are positions of sources and sensors measured with a differential GPS of accuracy better than 2 cm. We consider two types of angles. The 3D angle is the angle between the firing direction and the line from the muzzle to the sensor. By projecting these two lines on to a horizontal plane, we can calculate the horizontal angle. These two angles differ, because the firing direction is 18.7 degrees above the horizontal plane. We need both angles because the physics of the weapon is a function of the 3D angle, while MILSTØY is oriented towards calculating the noise

level in a horizontal plane near the ground. In the plots of time series and in tables, we refer to angles in the horizontal plane. The 3D angle is only applied in Subsection 5.8, where the directional interpolation is explained.

The mesurement site at Turrhaugen is at 960 m above sea level. The data then need to be scaled to sea level, e.g. sensor 1 at 254.47 m from the muzzle has a scaled distance of 244.21 m. In the rest of this report the distances mentioned are the scaled distances. These scaled distances and the horizontal angles can be seen in Table 5.1. The pressure and time references given in this report are scaled to sea level, and thus differ from those given in [11].

The time series of the pressure for M109 is plotted in Appendix B for all 12 sensors (shot nr. 15). The time axis is relative to a flash sensor pointing at the muzzle. The time axis is then relative to when the projectile leaves the muzzle.

The time series of the pressure from detonation of 1 kg TNT is plotted in Appendix C. The flash sensor could not be used for this measurement. In stead the time axis is relative to the time when the blast wave reaches the closest sensor.

Sensor	hor. angle [deg]	3D angle [deg]	hor. dist. [m]	3D dist. [m]	sensor height [m]
1	31.97	37.22	254.47	254.53	-5.65
2	39.51	43.70	250.24	250.31	-6.06
3	69.27	70.90	254.20	254.28	-6.43
4	91.46	91.79	253.84	253.90	-5.62
5	119.28	118.47	258.69	258.94	-11.18
6	149.54	146.69	259.28	259.84	-16.96
7	174.74	163.24	259.72	260.02	-12.38
8	33.69	39.42	129.75	129.89	-6.02
9	31.59	36.17	372.59	372.59	0.27
10	0.92	28.98	18.37	18.67	-3.33
11	59.54	65.37	19.14	19.44	-3.41
12	142.65	139.92	20.34	20.36	-0.80

Table 4.1: Sensor positions relative to the muzzle. Angles are relative to the firing direction. The sensor height is relative to a horizontal plane through the muzzle. The distances are the actual measured distances (and not the scaled).

5 Method for estimation of emission data

It is common that emission databases, that serve as input to linear propagation codes, give noise levels for free field sources. However, the measurements are made very close to the ground. We

then need to remove the influence of the ground from the measurements. This is accomplished by calculating the ground correction from measurement of detonation of 1 kg TNT, where we know the free field time series of the pressure. This ground correction is then used to calculate the free field sound exposure level of M109.

Removing the ground influence from these data is by no means a trivial task. For small weapons there exist several reasonably good methods to calculate free field emission data. They often take advantage of the fact that the source and sometimes the receiver are placed relatively high compared to the propagation distance. For the M109 these methods can not be applied. To the authors knowledge there exist no commonly accepted methods to perform this task.

The end result in a MILSTØY calculation for large weapons will typically be a noise map of C-weighted sound exposure level, L_{CE}. Although the procedure below might seem difficult to follow, a few factors are more dominant with regards to this end result. The M109 has the majority of its energy in the frequency range 5 Hz to 80 Hz. In this range the TNT calibration gives us about a 6 dB ground correction. Different choices in the procedure below may give rise to a variation of roughly $\pm$ 2 dB, often less than $\pm$ 1 dB. The main level of the emission data is still dominated by the levels found directly from the measurements, before further analysis.

The directivity of the noise from a weapon is given by the 3D angle relative to the firing direction. MILSTØY takes horizontal angles as input, so emission data have to be given this way for a specific elevation angle of the barrel of the M109. Emission data could be calculated for all elevation angles. Since the noise from M109 is not very directive, this will not have much effect. For other weapons this might not be the case.

Here we describe the steps needed to calculate the emission data (explained further in the Subsections below):

1. Scale measured data to sea level
2. Documentation of free field 1 kg TNT reference detonation
3. Algorithm that reproduces time series of the reference detonation
4. Calculate ground correction from free field 1 kg TNT reference data and 1 kg TNT measured at Hjerkinn
5. Modify ground correction
6. Add ground correction to measured M109 to produce free field M109 spectrum
7. Linearly scale the data to a reference level at 10 m, for use in MILSTØY
8. Curve fit to free field M109 data to find the spectrum at 0, 30, 60, 90, 120, 150 and 180 degrees shooting direction.

5.1 Scaling

The measurements at Hjerkinn were conducted 960 m above sea level. We then scale the results to what they would have been at sea level (Appendix A).

All results in [11] reports the pressure measured at Hjerkinn, without scaling. In this report all measurements are reported scaled to sea level at 15 degrees Celsius. The spectra for M109 presented in this report are based on Table E.2. This table is the scaled version of Table D.1 in [11]. Between these two tables there is a 0.87 dB difference in the sum sound exposure levels, where 0.51 dB accounts for the difference between the conditions at Hjerkin and at sea level. The remaining 0.36 dB accounts for the shorter scaled propagation distance (Table 5.1), and will not have any effect on the calculated emission data. In addition to the changes in the sum level, energy is slightly shifted to higher frequencies because of the scaling of the time axis.

Sensor	hor. angle [deg]	3D dist. scaled [m]
1	31.97	244.21
2	39.51	240.17
3	69.27	243.97
4	91.46	243.62
5	119.28	248.44
6	149.54	249.31
7	174.74	249.48
8	33.69	124.62
9	31.59	357.50
10	0.92	17.91
11	59.54	18.65
12	142.65	19.53

Table 5.1: Sensor positions relative to the muzzle, as referred to in most of this report.

5.2 Reference levels for 1 kg TNT

In a report from Maxwell Laboratories (made for FB), time series of the pressure is plotted for detonation of C4 explosives [16]. The pressure is given for an ideal surface at sea level. Time series of the pressure measured at Hjerkinn show a good correspondence with the plotted values for the sensors at 20 m from the source.

The time series in the Maxwell-report are for C4-data, while the detonations at Hjerkinn were with TNT. The Maxwell-report states that an equivalent weight of 1.32 can be applied. This seems

reasonable for our purpose (sound exposure level) as this value lies between the equivalent weight for pressure (1.37) and impulse (1.19) [17].

5.3 Time series for the reference detonation

We need the 1/3-octave spectrum for the reference detonation of TNT. To find this we first apply the FOFT-method to obtain the time series for the pressure [18, 3]. In essence the FOFT-method consists of experimental data for the peak pressure from Baker's book [19], and a model for the time series of the pressure by Reed [20].

The FOFT-method directly calculates the free field reference data for 1 kg TNT. It is these data that are employed to find the effect of the ground and the weather.

In order to increase our confidence in the values calculated with the FOFT-method, we have also used it to calculate the time series of the pressure with the ground present. In order to do this, we employ the "height of burst gain" to find an equivalent energy [17, 21]. In this case the energy of the detonation is calculated to be 2.54 times the energy from a free field detonation. Applying this energy as input for the FOFT-method, we calculate the time series for the pressure above ground (Appendix C).

The time series of the pressure was measured 20 m from the detonation of TNT. In Appendix C these measurements are compared with calculations done with the FOFT-method with ground present, with good agreement. This also means that the FOFT-method is in good agreement with the time series from the Maxwell-report. We now have three methods that have produced similar time series for the pressure above the ground, 20 m from the weapon. This strengthens our confidence in the FOFT-method, and also in the fact that the source indeed was a charge of 1 kg TNT that detonated normally.

Further away from the source (e.g. upper plot in Figure 5.2) the measured pressure does not resemble the free field reference. This is as should be expected, and is the reason we need to find a ground correction.

5.4 Ground correction

We often measure the sound level, L_{meas}, of large weapons between 100 to 500 m from the weapon. There the sound is assumed to be linear. The limit for when a sound is linear is often set to a peak pressure of 1 kPa or 0.1 kPa. In this Report we have applied the limit 1 kPa.

At a given distance from the source, a free field value, $L_{\mathsf{free\ field}}$, and a measured value over the ground is connected by

$$L_{\mathsf{meas}} = L_{\mathsf{free\ field}} + L_{\mathsf{ground}}, \tag{5.1}$$

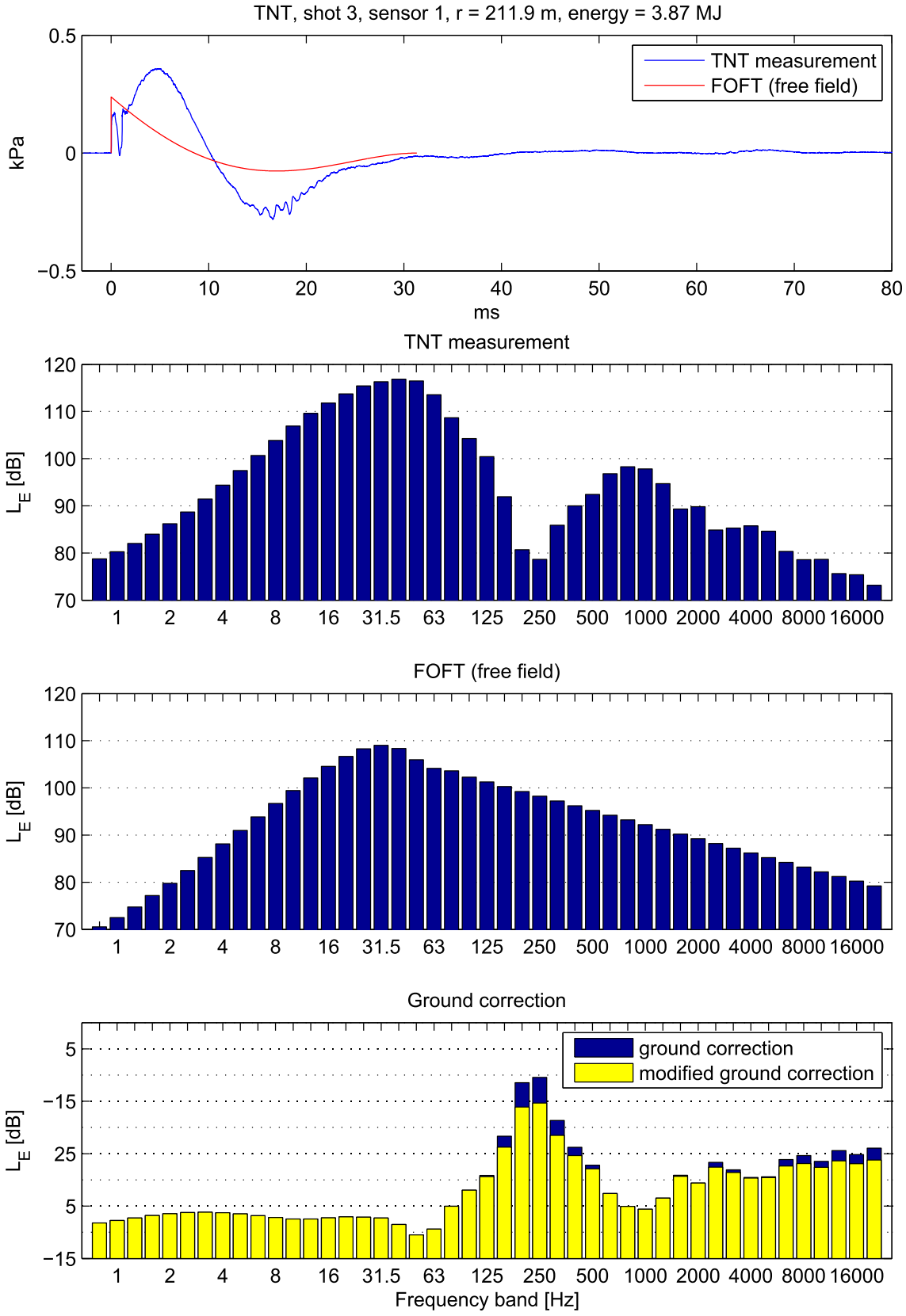


Figure 5.1: Example of generation of ground correction spectrum from calibration detonation of 1 kg TNT.

where L_{ground} is defined by this equation and reflects the influence of the ground and meteorological conditions. Now L_{ground} can be computed from the measured detonation of TNT and the free field calculation. This procedure is plotted in Figure 5.1.

The ground correction term L_{ground} reflects the change in sound level caused by the presence of the ground. This ground correction mainly consists of the linear sound reflected from the ground. In addition this there is a non-linear interaction with the ground near the source. Depending on the height of the source, non-linear interaction typically leads to higher amplitudes and a shift to slightly lower frequencies than in the linear case. Included in the ground correction there also is contributions from the meteorological conditions, e.g. due to a variation in the wind direction.

5.5 Modify ground correction

The ground correction should be identical for 1 kg TNT and the M109, assuming that geometrical and meteorological conditions are the same. The ground correction spectrum calculated from the reference detonation of TNT seems to work fairly well when applied to the measured data from the M109. However, there are three factors that limit the accuracy of the ground correction.

1. We have small fluctuations in the meteorological conditions
2. We were not able to place the TNT detonation at exactly the same location (horizontally) as the muzzle of the M109
3. The TNT was detonated closer to the ground (1.5 m) than the muzzle of the M109

Especially the last two factors may cause the dip in the power spectrum of the TNT to occur at a different frequency than for the M109. This has little influence on the sum levels of the measured spectra. However, we may get a large peak in the corrected spectrum for M109, around 250 Hz. This is because the peak of the correction spectrum (lower plot Figure 5.1) occur at another frequency than the dip in the spectrum for the M109.

The M109 has the main part of its energy in the frequency range from 5 Hz to 80 Hz. This artificial peak around 250 Hz will contribute in a non reasonable way to the sum level for the M109, and should therefore be removed.

There are numerous techniques to remove such phenomena. Finding the one best suited for this application would be too extensive for this report. We made some attempts to correct the difference in geometry by applying standard models for linear sound propagation, e.g. spherical reflection coefficient with impedance model from Delany-Bazley, Attenborough or Darcy-Taraldsen [22, 23]. Perhaps not surprisingly, these models do not explain the measured data sufficiently well, but introduce more errors than the more pragmatic procedure which has been chosen in this work to modify the ground correction spectrum.

To avoid the problem, the ground correction spectrum is modified around the top of the spectrum. The positive values of the ground correction spectrum are multiplied by 0.75, at frequencies below 1000 Hz. This solves the problem of frequency mismatch between the M109 and the TNT, but may result in too small values around 250 Hz. This is however not significant for the sum level of L_{CE}, since the main energy of the M109 is in the frequency range of 5 to 80 Hz.

Above 1000 Hz, a modification was added that reduces the positive ground correction when the measured pressure (for TNT) is very small. This is motivated by the notion that you do not want to add a huge ground correction based on a level that is so small that it has a lower signal quality. Again this is not significant for the sum level of L_{CE}

In the lower plot in Figure 5.1 we see the effect of modifying (yellow) the original ground correction (blue).

In the rest of this report we refer to the modified ground correction as simply the ground correction. The ground correction for all 6 directions are plotted and tabulated in Appendix D.

5.6 Adding ground correction to M109 spectrum

Sensor	hor. angle [deg]	L_E [dB]	L_{CE} [dB]	ground correction L_{CE} [dB]
1	31.97	130.5	125.3	-5.9
2	39.51	129.6	124.7	-5.3
3	69.27	128.3	122.7	-4.7
4	91.46	128.2	122.7	-5.5
5	119.28	127.1	121.9	-4.8
6	149.54	126.4	119.5	-3.1

Table 5.2: Effect of ground correction on sum levels.

In Figure 5.2 we show an example of adding the ground correction spectrum (lower plot Figure 5.1) to the measured spectrum from M109. In this example the correction spectrum is the mean energy of TNT shot 3 and 4. In Table 5.2 we see the effect of the ground correction on L_{CE} for all sensors. The resulting free field spectra at the 6 sensors is plotted and tabulated in Appendix E.

5.7 Linear scaling to 10 m reference level

The linear sound propagation code MILSTØY takes emission data as input at a reference position at 10 m, to calculate the sound back out to the position where the sound level was measured. Obviously the sound propagation is not linear at 10 m from the source. The sound level L_{10_ref} therefore does

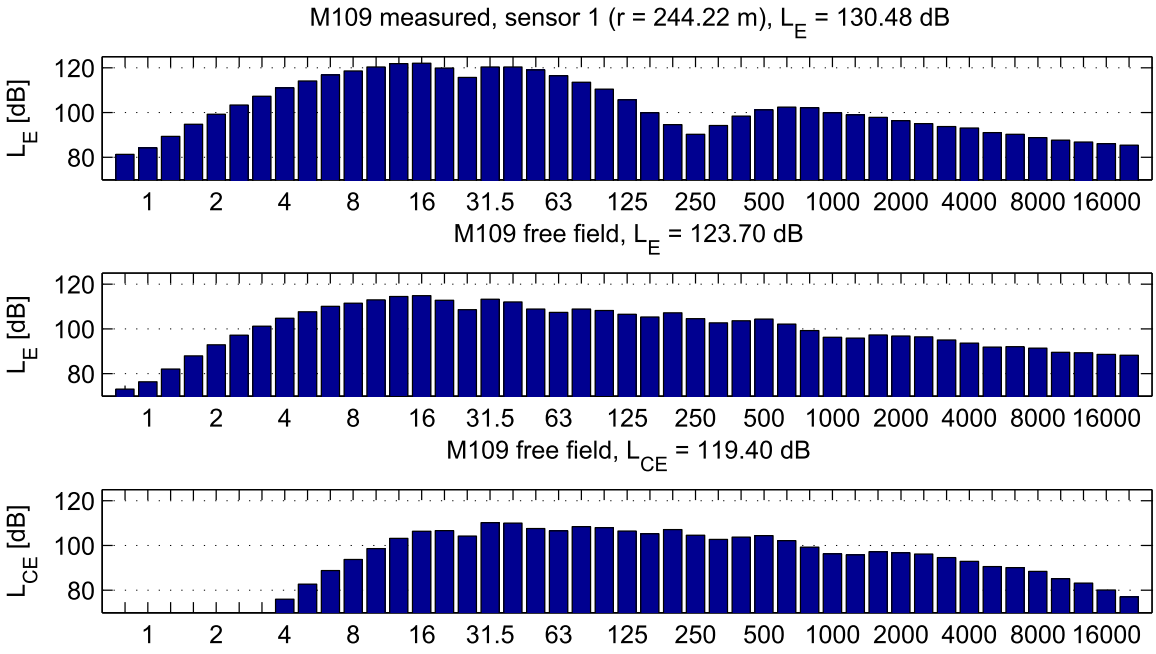


Figure 5.2: Example of adding the ground correction spectrum to M109 data.

not represent the actual sound level, but a linear reference level defined by (5.2). This reference level serves as a definition of the source strength in the emission database in MILSTØY.

$$L_{10\_\mathrm{ref}} = L_{\mathrm{free\ field}} + 10\log(r/10). \tag{5.2}$$

5.8 Directional interpolation

For the emission database we need the sound level at uniform angles from the firing direction. Therefore we fit the measured data to a function. This function is then used to find the sound level at uniform angles. Here we have chosen to fit the data to a cos-series with 3 degrees of freedom.

$$L_E(\theta) = a_0 + a_1\cos(\theta) + a_2\cos(2\theta). \tag{5.3}$$

The angles used for interpolation is the 3D angles. The curve fit is done with the least squares method [2, 12]. Since we have 6 measurement points we could have chosen to apply a series with 6 degrees of freedom. This would typically give good results for interpolation at angles between two sensors.

In this case however, we have no measurements between 0 and 37 degrees and between 147 and 180 degrees. We then need to extrapolate the values for these angles. At certain frequencies the extrapolation of data from 0 degrees to sensor 1 at 37 degrees is somewhat sensitive to the number of terms in the series.

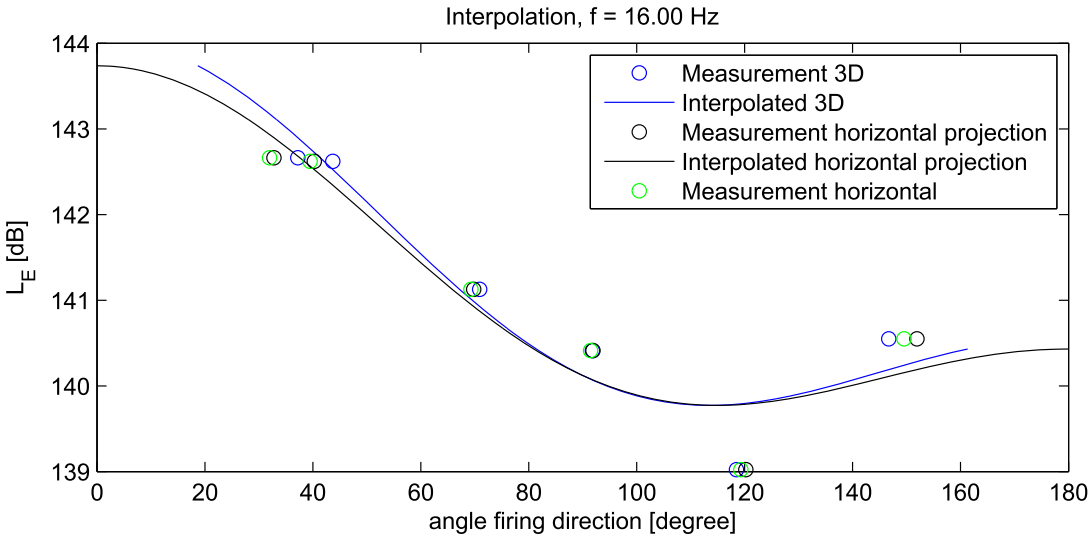


Figure 5.3: Example of angular interpolation at 16 Hz. The blue curve represents the data in 3D angles. The black curve represents the horizontal projection.

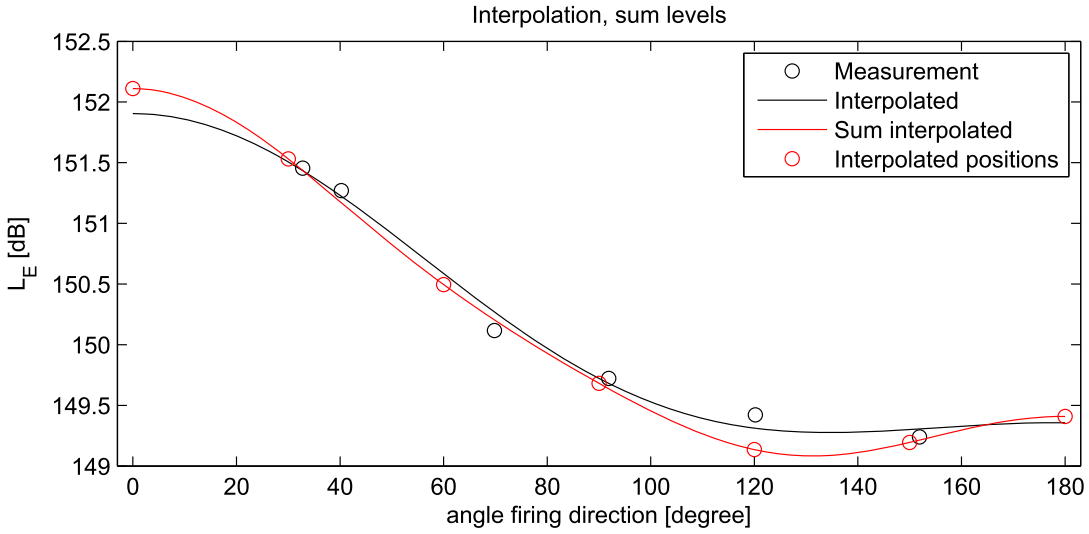


Figure 5.4: Interpolation of sum levels.

We then apply this curve fit to the 6 measurement points for all the 45 frequencies. An example is shown for 16 Hz in Figure 5.3. The blue line is the interpolated curve in 3D angles. The corresponding curve projected down into a horizontal plane through the muzzle is shown in black. The green circles indicate the actual horizontal angles of the sensors, which are different, because the sensors were placed somewhat below the horizontal plane through the muzzle (Table 4.1).

In Figure 5.4 the black line represents the interpolation between the sum levels of the 6 sensors (corresponding to the black curve in Figure 5.3). To arrive at the red curve we have first found an interpolated curve for each of the 45 frequencies (like the 16 Hz black curve in Figure 5.3). We have then taken the energy sum of these 45 curves. The similarity between the curves in Figure 5.4 indicate that the interpolation has worked well at all the 45 frequencies. The red circles indicate the estimated sum levels at the uniform angles used for the input to the emission database. The free field spectrum for M109, at uniform angles, for a reference level at 10 m, is tabulated in Table F.1. This table gives the emission data for M109.

6 Summary

A method has been demonstrated to calculate emission data for large caliber weapons. In Appendix H the emission data for the M109A3GN field howitzer is presented in a form that is suitable for inclusion in the database of the linear propagation code MILSTØY.

A Scaling

Emission data is often given at sea level conditions. We therefore need to scale the data from the conditions at the measurement cite, to sea level conditions. When calculating sound propagation we could also apply this scaling. The propagation medium is here defined by the height above sea level, h, and the air temperature, T.

A.1 Reference conditions (0) at sea level

At sea level the ambient air pressure is taken to be $p_{\text{atm}}^{(0)} = 101.325 \cdot 10^5$ kPa. The reference temperature is 15 degrees Celsius. Then the speed of sound is $c^{(0)} = 340.3$ m/s.

A.2 Standard atmosphere at h m above sea level

In [24] variation of the atmospheric pressure ,$p_{\text{atm}}^{(h)}$, as a function of h is given for a standard atmosphere, together with the sound speed, $c^{(h)}$, as a function of temperature.

Up to 11000 m above sea level the following formula can be used for the standard pressure at the height h

$$p_{\text{atm}}^{(h)} = p_{\text{atm}}^{(0)} \left[\frac{288.15}{288.15 - 0.0065h} \right]^{-5.2559}. \tag{A.1}$$

The sound speed is given by

$$c^{(h)} = c^{(0)} \sqrt{\frac{273.15 + T}{288.15}}. \tag{A.2}$$

Note that $c^{(0)}$ is the speed of sound at 15 degrees Celsius ($h = 0$), not at 0 degrees Celsius.

A.3 Sachs scaling

By Sachs scaling ([19, 17]) we find dimensionless pressure, $\bar{p}$, and time, $\bar{t}$, as a function of only the dimensionless distance , $\bar{t}$.

The Sachs scaling can be interpreted in the following way. Given a measurement of a time series of pressure at a specific distance, we can apply Sachs scaling. We then get a dimensionless time series of pressure at a certain dimensionless distance from the source. For each dimensionless distance there exist a time series. As we move further away from the source the time series broadens, i.e. the energy is shifted to lower frequencies (close to the source). We have knowledge only of the time series at the specific (measured) dimensionless distance. We may now scale the dimensionless time series back to another pressure and temperature condition. We then get a dimensional time series at a new dimensional distance from the source. If we are interested in the pressure at the original distance from the source, some sort of calculation must be performed to transfer the characteristics

of the time series to the original distance. This is easily done for the present application, since the measurements are conducted in the linear region.

The input to the scaling are the distance to the source, r, the energy of the explosives, E, the time, t and the pressure, p. These four combines to the dimensionless pressure and time.

$$\begin{aligned} \bar{r} &= \frac{r\, p_{\text{atm}}^{1/3}}{E^{1/3}}, \\ \bar{p} &= \frac{p}{p_{\text{atm}}}, \\ \bar{t} &= \frac{t\, c\, p_{\text{atm}}^{1/3}}{E^{1/3}}. \end{aligned} \tag{A.3}$$

A.4 Scaling of impulse noise in MILSTØY

Source data is generally given at sea level, for a standard ambient pressure and temperature. At present MILSTØY do not contain any correction for height above sea level. For higher h the air pressure is lower, and the sound pressure from a weapon will be smaller. For lower air temperature, the sound speed is lower and the sound pressure from a weapon will be higher. The scaling is more sensitive to change in the ambient air pressure.

This variation can be quantified by scaling. By equating the dimensionless quantities from the two different propagation conditions from (A.2), we get the scaling factors

$$\begin{aligned} r^{(h)} &= \left(\frac{p_{\text{atm}}^{(0)}}{p_{\text{atm}}^{(h)}}\right)^{1/3} r^{(0)}, \\ p^{(h)} &= \frac{p_{\text{atm}}^{(h)}}{p_{\text{atm}}^{(0)}} p^{(0)}, \\ t^{(h)} &= \left(\frac{p_{\text{atm}}^{(0)}}{p_{\text{atm}}^{(h)}}\right)^{1/3} \frac{c^{(0)}}{c^{(h)}} t^{(0)}. \end{aligned} \tag{A.4}$$

Ultimately we want to estimate L_E (sound exposure level [2]) or sound levels that can be found from L_E.

$$L_E = 10 \log \left(\frac{SE}{s\, p_{\text{ref}}^2} \right), \tag{A.5}$$

where the sound exposure is given by

$$SE \equiv \int_0^T p(t)^2\, dt, \tag{A.6}$$

$p_{\text{ref}} = 2 \cdot 10^{-5}$ Pa. Thus, scaling of SE is given by

$$SE^{(h)} = \left(\frac{p_{\text{atm}}^{(h)}}{p_{\text{atm}}^{(0)}}\right)^2 \left(\frac{p_{\text{atm}}^{(0)}}{p_{\text{atm}}^{(h)}}\right)^{1/3} \frac{c^{(0)}}{c^{(h)}} SE^{(0)}, \qquad r = r^{(h)}, \tag{A.7}$$

since the distance from the source is also scaled. However, we want SE given for the specified height at the original distance $r = r^{(0)}$. We now assume linear sound propagation, i.e. no time scaling and pressure scaling $r^{(h)}/r^{(0)}$. Thus

$$SE^{(h)} = \left(\left(\frac{p_{\text{atm}}^{(0)}}{p_{\text{atm}}^{(h)}} \right)^{1/3} \frac{p_{\text{atm}}^{(h)}}{p_{\text{atm}}^{(0)}} \right)^2 \left(\frac{p_{\text{atm}}^{(0)}}{p_{\text{atm}}^{(h)}} \right)^{1/3} \frac{c^{(0)}}{c^{(h)}} SE^{(0)} = \frac{p_{\text{atm}}^{(h)}}{p_{\text{atm}}^{(0)}} \frac{c^{(0)}}{c^{(h)}} SE^{(0)}, \qquad r = r^{(0)}. \quad \text{(A.8)}$$

The difference in L_E is then given by

$$L_E^{(h)} = 10 \log \left(\frac{p_{\text{atm}}^{(h)}}{p_{\text{atm}}^{(0)}} \frac{c^{(0)}}{c^{(h)}} \right) + L_E^{(0)}. \quad \text{(A.9)}$$

From (A.1) and (A.2) we then get a simple formula for the scaling of L_E, as a function of h and T, in standard atmosphere:

$$L_E^{(h)} = 10 \log \left(\frac{\left[\frac{288.15}{288.15 - 0.0065h} \right]^{-5.2559}}{\sqrt{\frac{273.15+T}{288.15}}} \right) + L_E^{(0)}. \quad \text{(A.10)}$$

As an example we consider the measurements performed at Hjerkinn (actually closer to Dombås), where $h = 960$ m and $T = 10.5$ degrees Celsius. Then (A.10) gives

$$L_E^{(h)} = -0.50\,\text{dB} + 0.03\,\text{dB} + L_E^{(0)} = -0.47\,\text{dB} + L_E^{(0)}, \quad \text{(A.11)}$$

where we also see the individual contributions of the pressure and the temperature respectively.

At Hjerkinn we also measured the actual atmospheric pressure, $p_{\text{atm}}^{(h)}/p_{\text{atm}}^{(0)} = 0.883$. Then from (A.2) and (A.9) we get

$$L_E^{(h)} = -0.54\,\text{dB} + 0.03\,\text{dB} + L_E^{(0)} = -0.51\,\text{dB} + L_E^{(0)}, \quad \text{(A.12)}$$

A.5 Scaling factors for the measurements at Hjerkinn

At Hjerkinn (shooting from Turrhaugen) 960 m above sea level, the pressure was measured to $p_{\text{atm}}^{(h)} = 0.895 \cdot 10^5$ Pa and the temperature 10.5 degrees Celsius. From (A.2) we get the sound speed $c^{(h)} = 337.6$ m/s. From (A.4) we get

$$\begin{aligned} r^{(0)} &= \left(\frac{p_{\text{atm}}^{(h)}}{p_{\text{atm}}^{(0)}} \right)^{1/3} r^{(h)}, \\ p^{(0)} &= \frac{p_{\text{atm}}^{(0)}}{p_{\text{atm}}^{(h)}} p^{(h)}, \\ t^{(0)} &= \left(\frac{p_{\text{atm}}^{(h)}}{p_{\text{atm}}^{(0)}} \right)^{1/3} \frac{c^{(h)}}{c^{(0)}} t^{(h)}. \end{aligned} \quad \text{(A.13)}$$

By inserting the parameters for the condition at the measurement cite we get

$$\begin{aligned} r^{(0)} &= 0.959\, r^{(h)}, \\ p^{(0)} &= 1.132\, p^{(h)}, \\ t^{(0)} &= 0.952\, t^{(h)}, \end{aligned} \tag{A.14}$$

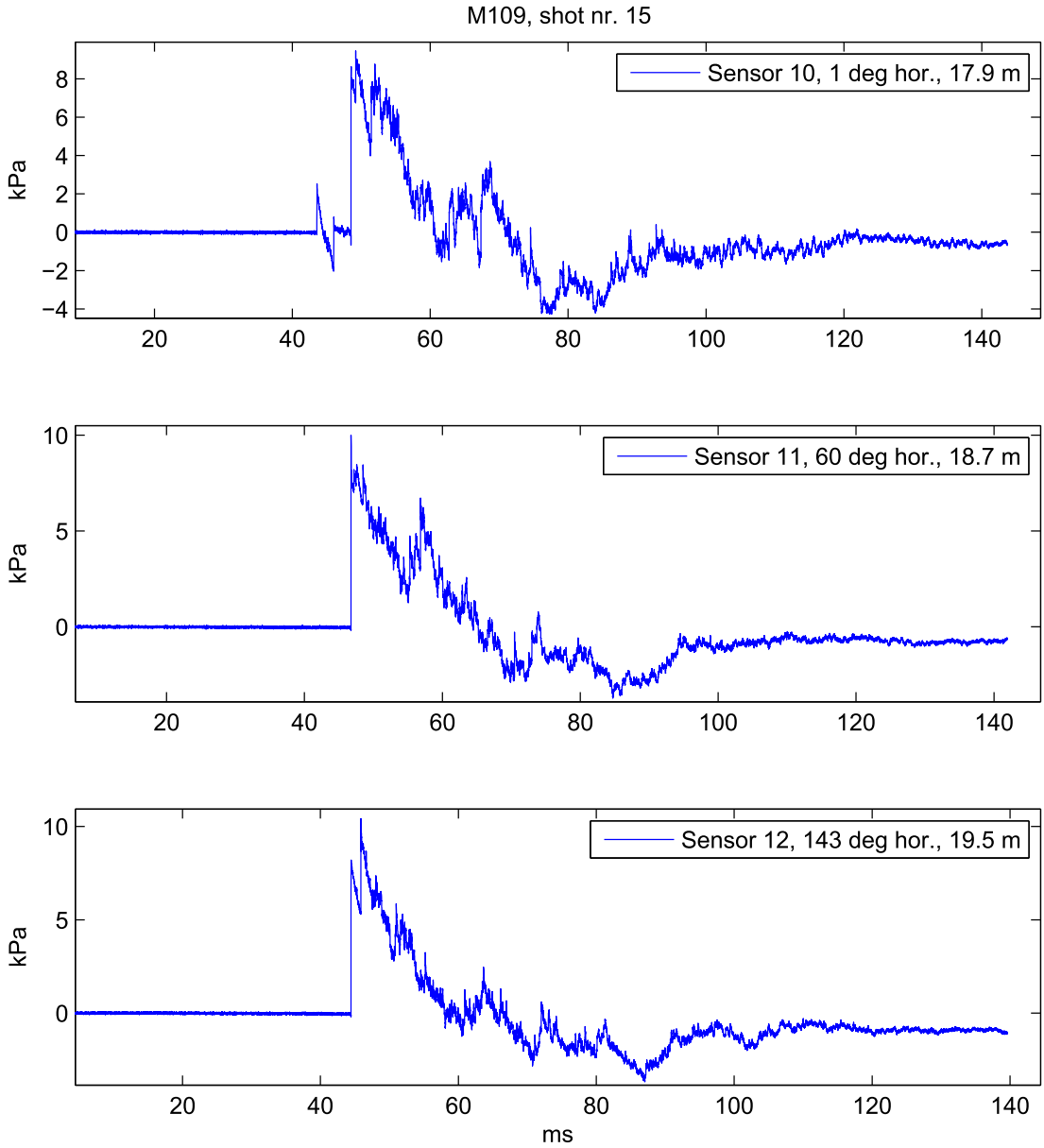
at the distance $r = r^{(0)}$ from the source. By performing the same linear calculation as in A.4 we get

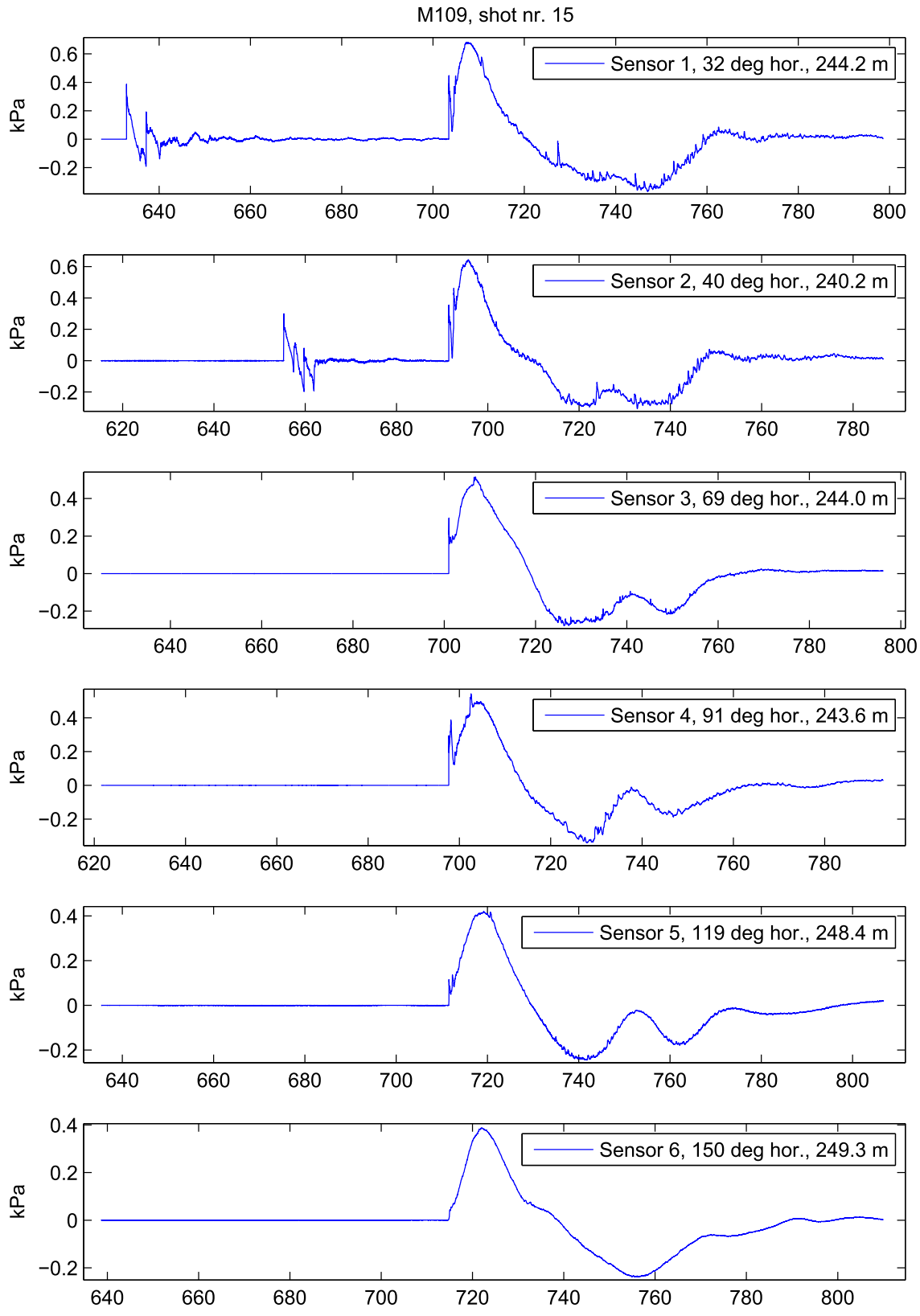
$$\begin{aligned} p^{(0)} &= 1.086\, p^{(h)}, \\ t^{(0)} &= 0.952\, t^{(h)}, \end{aligned} \tag{A.15}$$

at the distance $r = r^{(h)}$ from the source.

B Timeseries M109

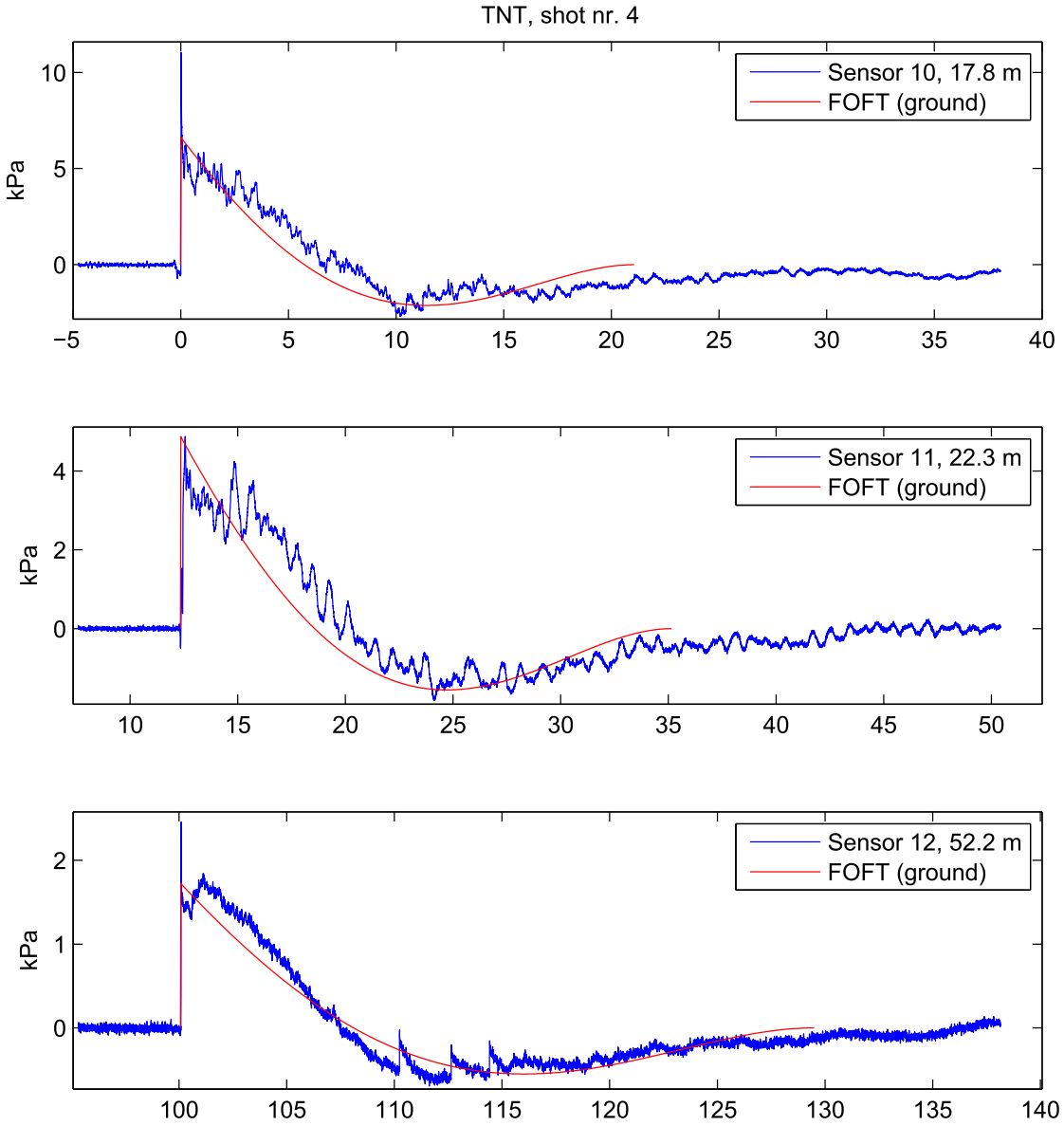
Timeseries for shot 15 for M109. The time is set relative to the flash sensor at the muzzle of the gun, i.e. the point in time when the projectile leaves the muzzle of the gun. All variables are scaled to sea level at 15 degrees Celsius.

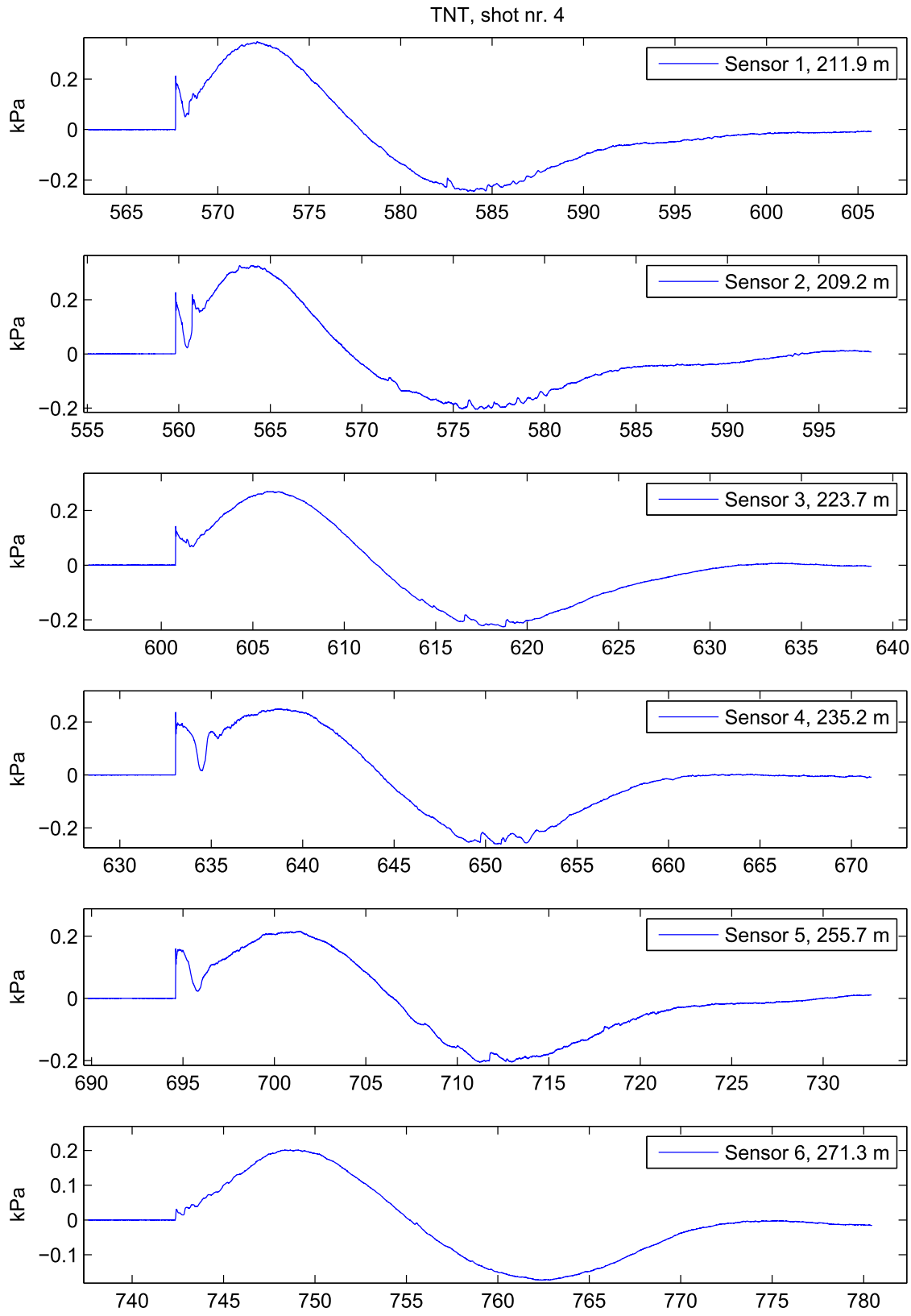


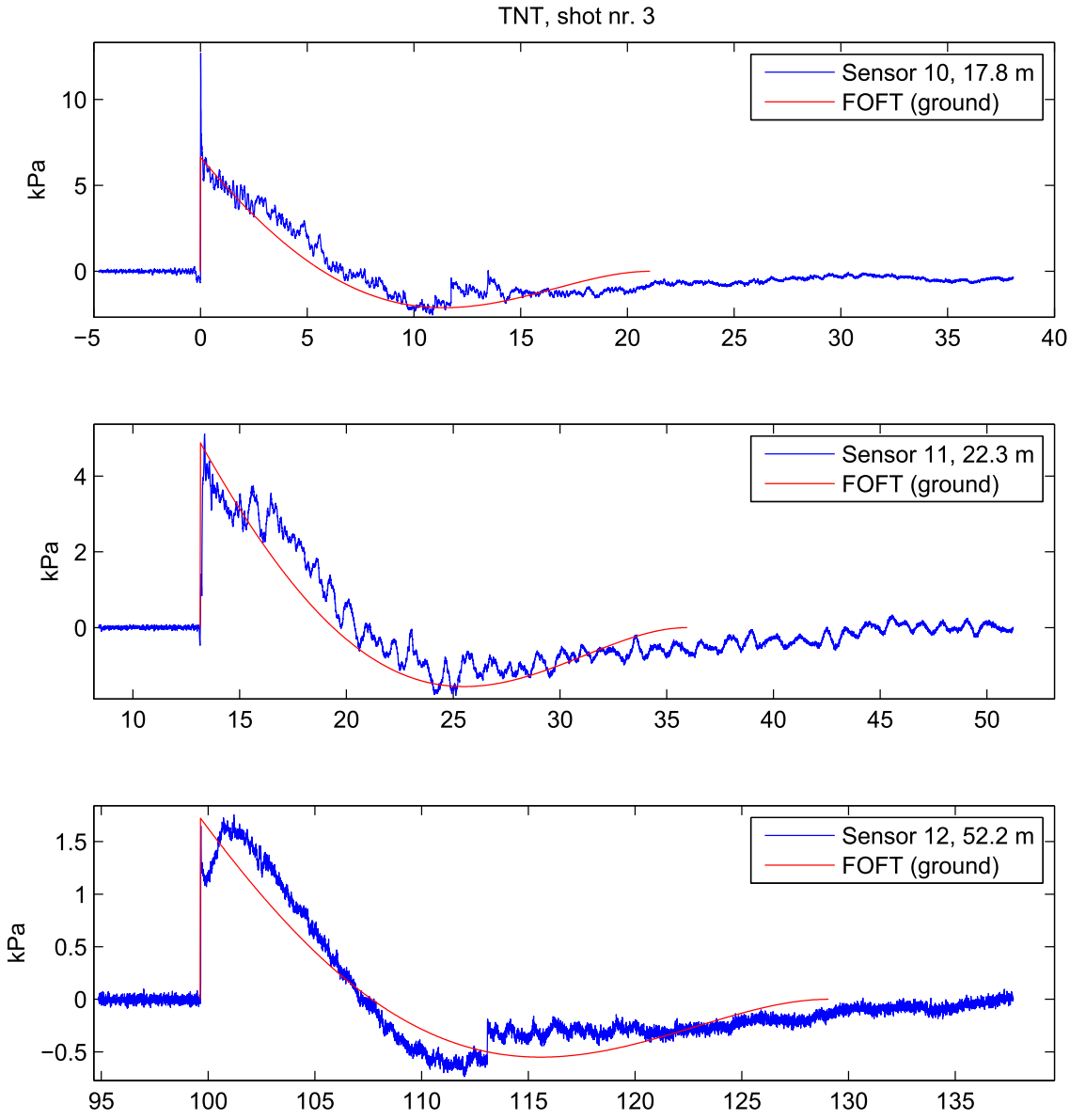

M109, shot nr. 15
Sensor 1, 32 deg hor., 244.2 m
Sensor 2, 40 deg hor., 240.2 m
Sensor 3, 69 deg hor., 244.0 m
Sensor 4, 91 deg hor., 243.6 m
Sensor 5, 119 deg hor., 248.4 m
Sensor 6, 150 deg hor., 249.3 m
kPa

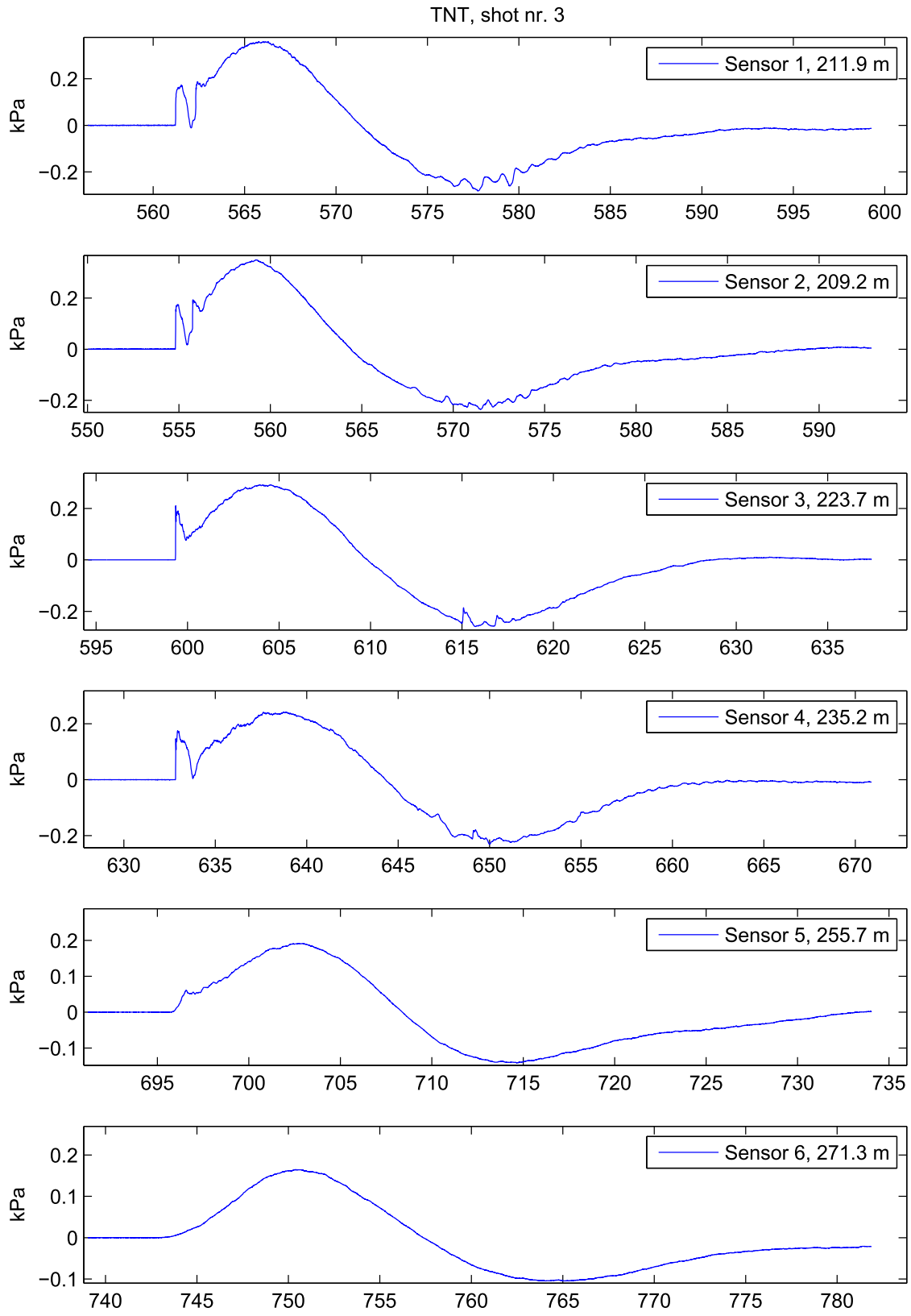
C Timeseries TNT

Timeseries for detonation 3 and 4 of 1 kg TNT. The ground correction is found by calculating the mean of the L_{E} spectra of these two. The time is set relative to the time when the shock front reaches sensor 10. All variables are scaled to sea level at 15 degrees Celsius.

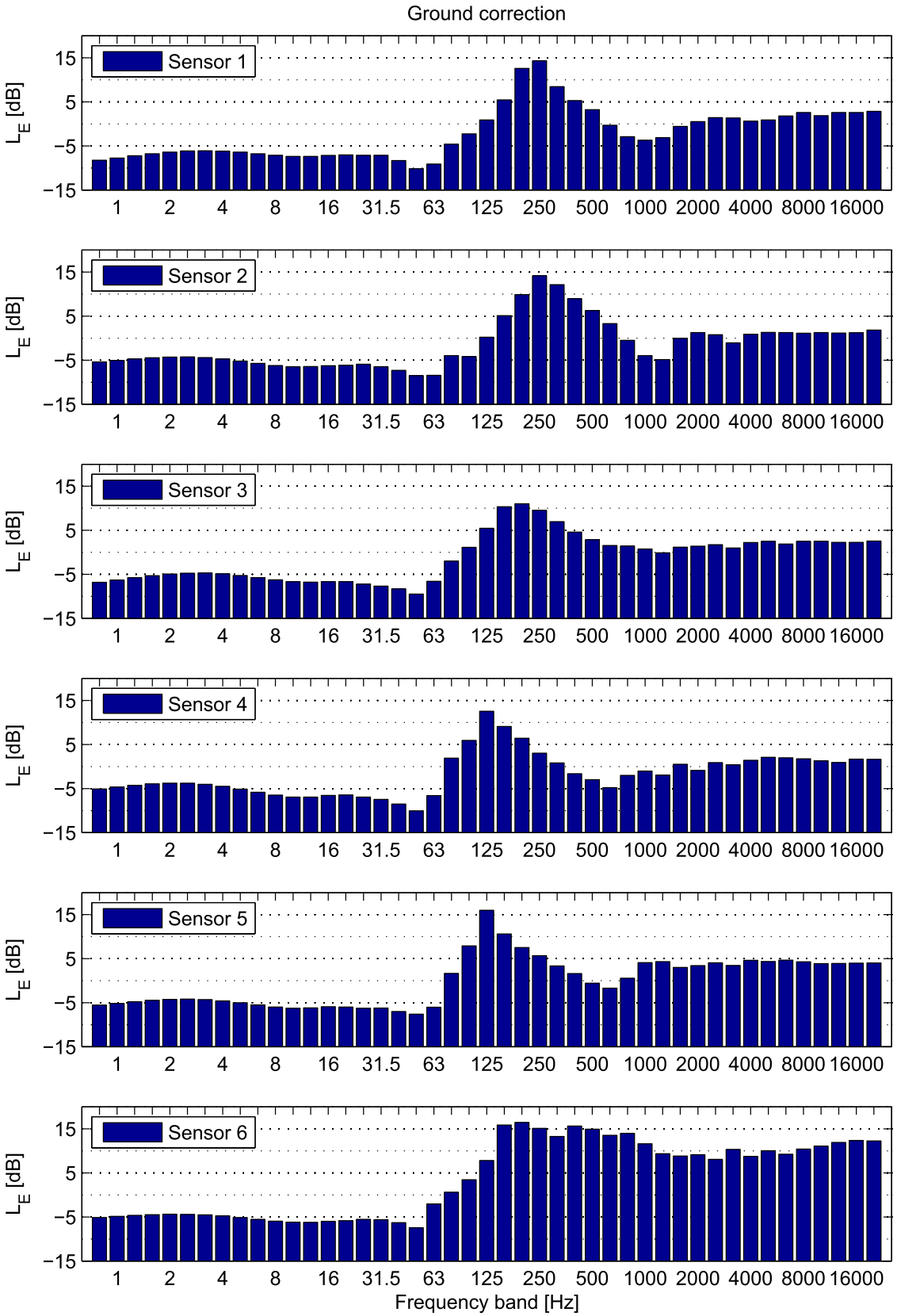



TNT, shot nr. 4
Sensor 1, 211.9 m
Sensor 2, 209.2 m
Sensor 3, 223.7 m
Sensor 4, 235.2 m
Sensor 5, 255.7 m
Sensor 6, 271.3 m
kPa


TNT, shot nr. 3
Sensor 10, 17.8 m
FOFT (ground)
kPa
Sensor 11, 22.3 m
FOFT (ground)
kPa
Sensor 12, 52.2 m
FOFT (ground)
kPa


TNT, shot nr. 3
Sensor 1, 211.9 m
Sensor 2, 209.2 m
Sensor 3, 223.7 m
Sensor 4, 235.2 m
Sensor 5, 255.7 m
Sensor 6, 271.3 m
kPa

D Ground correction



Freq	Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6
0.8	-8.3	-5.4	-6.8	-5.1	-5.6	-5.1
1	-7.8	-5.0	-6.3	-4.7	-5.2	-4.9
1.25	-7.2	-4.7	-5.8	-4.3	-4.8	-4.7
1.6	-6.8	-4.4	-5.3	-3.9	-4.4	-4.5
2	-6.4	-4.3	-4.9	-3.8	-4.2	-4.4
2.5	-6.2	-4.3	-4.7	-3.8	-4.2	-4.4
3.15	-6.1	-4.4	-4.7	-4.0	-4.3	-4.5
4	-6.2	-4.8	-4.9	-4.5	-4.6	-4.8
5	-6.4	-5.2	-5.3	-5.1	-5.0	-5.1
6.3	-6.8	-5.7	-5.7	-5.8	-5.5	-5.5
8	-7.1	-6.2	-6.3	-6.5	-6.0	-5.9
10	-7.4	-6.5	-6.7	-6.9	-6.2	-6.2
12.5	-7.4	-6.5	-6.8	-6.9	-6.2	-6.2
16	-7.1	-6.3	-6.7	-6.6	-5.9	-6.0
20	-7.1	-6.1	-6.7	-6.4	-6.0	-5.8
25	-7.1	-5.9	-7.2	-6.9	-6.3	-5.5
31.5	-7.1	-6.5	-7.7	-7.5	-6.2	-5.6
40	-8.3	-7.3	-8.3	-8.5	-7.0	-6.3
50	-10.2	-8.5	-9.5	-10.1	-7.6	-7.5
63	-9.1	-8.4	-6.6	-6.6	-6.0	-2.0
80	-4.6	-3.9	-2.0	1.9	1.7	0.6
100	-2.3	-4.2	1.1	5.9	7.9	3.5
125	0.9	0.2	5.4	12.5	16.0	7.8
160	5.4	5.1	10.4	9.1	10.6	15.8
200	12.6	9.9	11.0	6.4	7.5	16.4
250	14.3	14.2	9.6	3.0	5.7	15.1
315	8.4	12.1	7.0	0.8	3.3	13.2
400	5.3	8.9	4.6	-1.6	1.6	15.6
500	3.2	6.3	2.9	-3.0	-0.6	14.9
630	-0.3	3.3	1.5	-4.8	-1.7	13.5
800	-2.9	-0.5	1.4	-2.0	0.6	14.0
1000	-3.7	-4.0	0.7	-1.0	4.1	11.6
1250	-3.1	-4.9	-0.1	-1.9	4.3	9.3
1600	-0.6	-0.0	1.2	0.5	3.0	8.8
2000	0.5	1.3	1.4	-0.9	3.4	9.1
2500	1.4	0.8	1.7	0.9	4.1	8.1
3150	1.3	-1.1	1.0	0.4	3.4	10.3
4000	0.6	0.9	2.2	1.4	4.6	8.7
5000	0.9	1.3	2.5	2.1	4.4	10.0
6300	1.8	1.3	1.9	2.0	4.7	9.2
8000	2.6	1.1	2.5	1.8	4.3	10.4
10000	1.9	1.3	2.5	1.3	3.9	11.1
12500	2.6	1.1	2.3	0.9	3.9	11.9
16000	2.6	1.2	2.2	1.7	4.0	12.4
20000	2.8	1.8	2.6	1.6	4.0	12.2

Table D.1: Ground correcton in 6 directions (in dB).

E Free field spectrum M109, 245 m from muzzle

The levels have been produced taking the energy mean of the 15 shots. The procedure is described in [2]. This is free field values for M109, resulting from removing the ground effect from the measured levels. Figures E.1–E.6 are graphical interpretations of Table E.1.

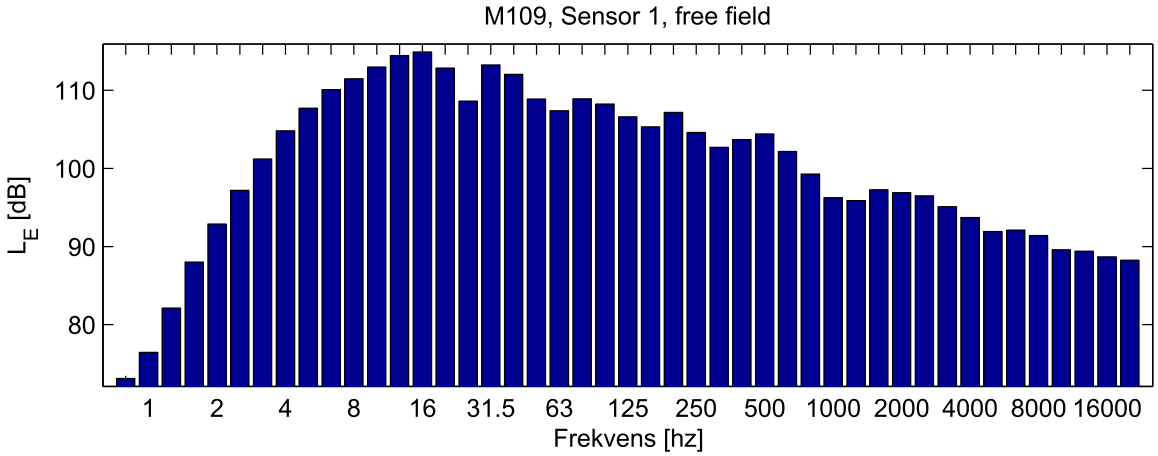


Figure E.1: Free field M109 at sensor 1, 32 degrees (horizontal) from the firing direction, 244 m from the muzzle.

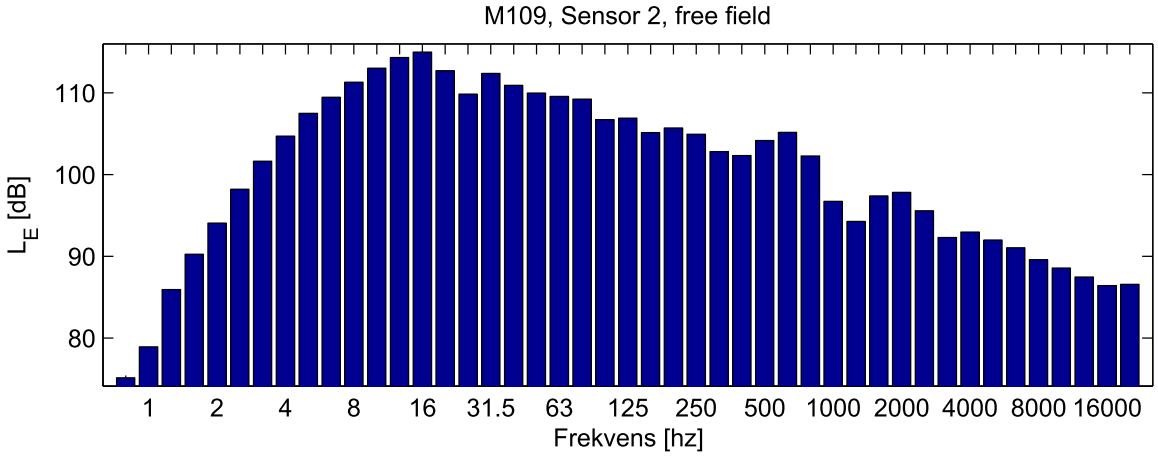


Figure E.2: Free field M109 at sensor 2, 40 degrees (horizontal) from the firing direction, 240 m from the muzzle.

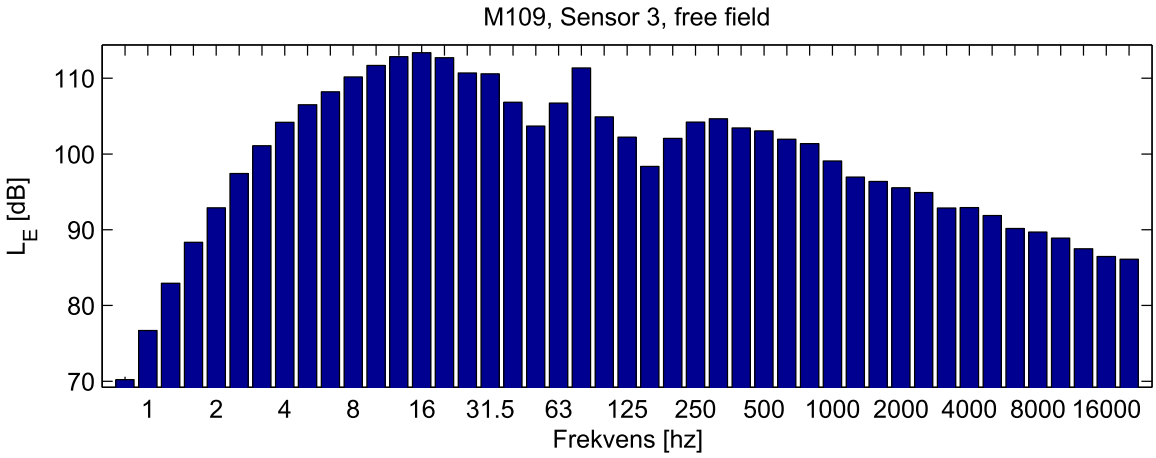


Figure E.3: Free field M109 at sensor 3, 69 degrees (horizontal) from the firing direction, 244 m from the muzzle..

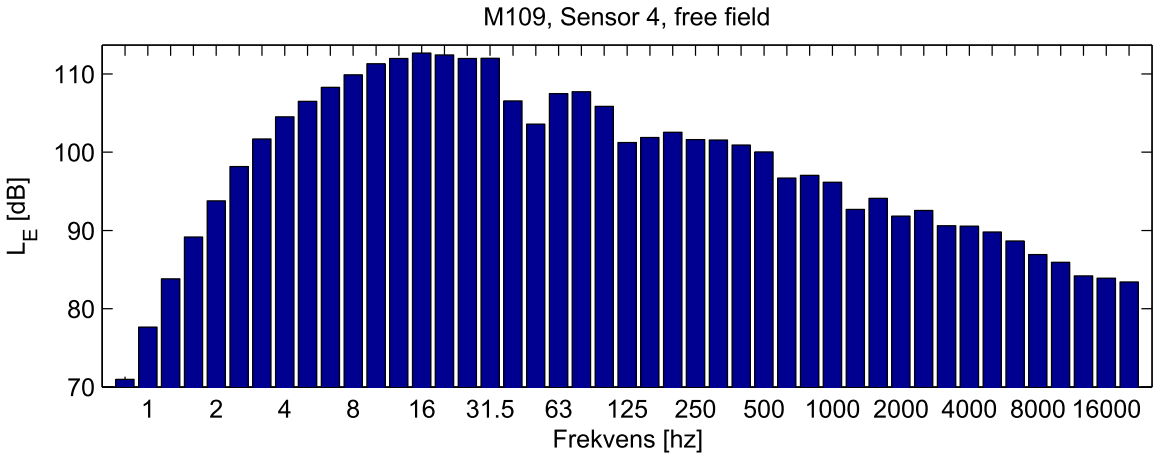


Figure E.4: Free field M109 at sensor 4, 91 degrees (horizontal) from the firing direction, 244 m from the muzzle..

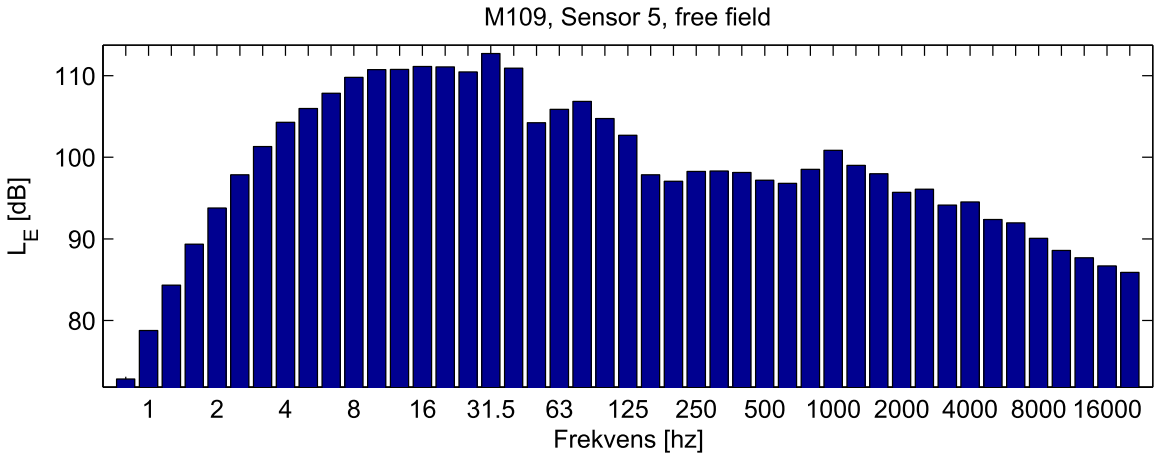


Figure E.5: Free field M109 at sensor 5, 119 degrees (horizontal) from the firing direction, 248 m from the muzzle..

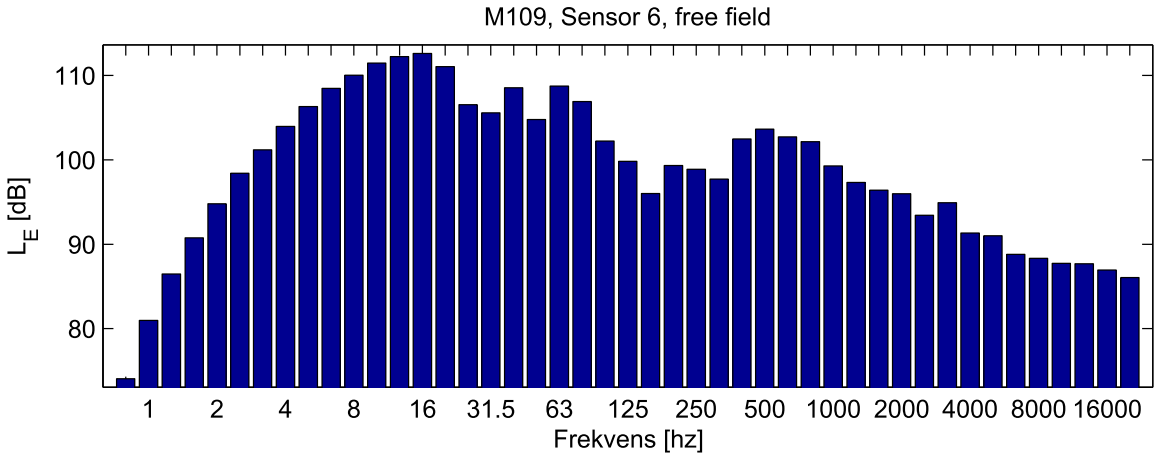


Figure E.6: Free field M109 at sensor 6, 150 degrees (horizontal) from the firing direction, 249 m from the muzzle..

Freq	Sensor 1 32 deg	Sensor 2 40 deg	Sensor 3 69 deg	Sensor 4 91 deg	Sensor 5 119 deg	Sensor 6 150 deg
Sum	123.7	123.7	122.4	122.0	121.5	121.3
0.8	73.1	75.1	70.2	71.0	72.8	74.1
1	76.4	78.9	76.7	77.6	78.8	81.0
1.25	82.1	85.9	82.9	83.8	84.3	86.5
1.6	88.0	90.3	88.3	89.2	89.3	90.8
2	92.9	94.1	92.9	93.8	93.8	94.8
2.5	97.2	98.2	97.4	98.2	97.9	98.4
3.15	101.2	101.6	101.1	101.7	101.3	101.2
4	104.8	104.7	104.2	104.5	104.3	104.0
5	107.7	107.5	106.5	106.5	106.0	106.3
6.3	110.1	109.5	108.2	108.3	107.8	108.5
8	111.5	111.3	110.2	109.9	109.8	110.0
10	113.0	113.0	111.7	111.3	110.7	111.5
12.5	114.5	114.3	112.9	112.0	110.8	112.2
16	114.9	115.0	113.4	112.7	111.1	112.6
20	112.8	112.7	112.7	112.4	111.1	111.1
25	108.6	109.9	110.7	112.0	110.5	106.5
31.5	113.2	112.4	110.6	112.0	112.7	105.6
40	112.0	110.9	106.8	106.6	110.9	108.5
50	108.9	110.0	103.7	103.6	104.2	104.8
63	107.4	109.6	106.7	107.5	105.9	108.7
80	108.9	109.3	111.4	107.7	106.8	106.9
100	108.3	106.7	104.9	105.9	104.8	102.2
125	106.6	106.9	102.2	101.3	102.7	99.8
160	105.3	105.2	98.4	101.9	97.9	96.0
200	107.2	105.7	102.0	102.6	97.1	99.3
250	104.6	104.9	104.2	101.6	98.3	98.9
315	102.7	102.8	104.7	101.5	98.3	97.7
400	103.7	102.3	103.4	100.9	98.1	102.5
500	104.4	104.2	103.1	100.0	97.2	103.6
630	102.2	105.2	102.0	96.7	96.8	102.7
800	99.3	102.3	101.4	97.1	98.5	102.2
1000	96.2	96.7	99.1	96.2	100.8	99.3
1250	95.9	94.3	97.0	92.7	99.0	97.3
1600	97.3	97.4	96.4	94.1	98.0	96.4
2000	96.9	97.8	95.5	91.8	95.7	96.0
2500	96.5	95.6	94.9	92.5	96.1	93.4
3150	95.1	92.3	92.9	90.6	94.1	94.9
4000	93.7	93.0	92.9	90.5	94.5	91.3
5000	91.9	92.0	91.9	89.8	92.4	91.0
6300	92.1	91.1	90.2	88.7	92.0	88.8
8000	91.4	89.6	89.7	86.9	90.1	88.3
10000	89.6	88.6	88.9	85.9	88.6	87.7
12500	89.4	87.5	87.5	84.2	87.7	87.7
16000	88.7	86.4	86.5	83.9	86.7	86.9
20000	88.3	86.6	86.1	83.4	85.9	86.0

Table E.1: Free field M109, approximately scaled distanced 245 m. Angles are in the horizontal plane.

Freq	Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6	Sensor 7
	32 deg	40 deg	69 deg	91 deg	119 deg	150 deg	175 deg
Sum	130.5	129.6	128.3	128.2	127.1	126.4	126.8
0.8	81.4	80.5	77.0	76.0	78.4	79.2	90.1
1	84.2	84.0	83.0	82.3	83.9	85.8	90.6
1.25	89.4	90.7	88.7	88.1	89.1	91.1	91.1
1.6	94.8	94.7	93.6	93.1	93.8	95.2	93.3
2	99.3	98.4	97.8	97.6	98.0	99.2	98.0
2.5	103.3	102.5	102.2	102.0	102.1	102.8	101.6
3.15	107.3	106.1	105.8	105.7	105.6	105.7	104.3
4	111.0	109.5	109.1	109.0	108.9	108.7	107.2
5	114.1	112.7	111.8	111.7	111.0	111.4	110.1
6.3	116.9	115.2	114.0	114.1	113.3	114.0	113.0
8	118.6	117.5	116.4	116.4	115.8	116.0	115.3
10	120.4	119.5	118.3	118.2	117.0	117.7	117.2
12.5	121.8	120.8	119.6	118.9	117.0	118.5	118.4
16	122.1	121.3	120.0	119.2	117.0	118.6	119.0
20	119.9	118.9	119.4	118.9	117.0	116.9	117.8
25	115.8	115.8	117.9	118.9	116.7	112.1	112.5
31.5	120.4	118.9	118.3	119.5	118.9	111.2	110.4
40	120.4	118.2	115.1	115.1	117.9	114.8	115.6
50	119.1	118.5	113.2	113.7	111.8	112.2	116.1
63	116.5	118.0	113.3	114.1	111.9	110.8	114.2
80	113.5	113.2	113.4	105.8	105.2	106.3	108.3
100	110.5	110.9	103.8	99.9	96.8	98.8	102.4
125	105.7	106.7	96.8	88.7	86.7	92.0	95.9
160	99.9	100.1	88.0	92.8	87.2	80.2	84.4
200	94.6	95.8	91.0	96.1	89.5	82.9	87.2
250	90.3	90.8	94.7	98.6	92.6	83.8	90.1
315	94.3	90.7	97.7	100.8	95.0	84.5	92.5
400	98.4	93.4	98.8	102.5	96.5	86.9	93.4
500	101.2	97.9	100.2	103.0	97.8	88.7	96.0
630	102.5	101.9	100.4	101.5	98.5	89.2	97.4
800	102.2	102.8	99.9	99.1	98.0	88.2	96.6
1000	99.9	100.7	98.3	97.2	96.7	87.7	94.7
1250	99.0	99.1	97.1	94.6	94.7	88.0	92.7
1600	97.8	97.4	95.2	93.6	95.0	87.6	92.5
2000	96.4	96.6	94.2	92.7	92.3	86.9	91.2
2500	95.1	94.8	93.2	91.7	92.0	85.4	90.2
3150	93.8	93.4	91.9	90.2	90.7	84.6	88.6
4000	93.1	92.1	90.7	89.1	89.9	82.6	87.0
5000	91.1	90.7	89.4	87.7	88.0	81.0	86.8
6300	90.3	89.8	88.3	86.7	87.3	79.6	85.7
8000	88.8	88.5	87.2	85.2	85.8	77.9	85.4
10000	87.7	87.3	86.4	84.6	84.7	76.6	84.8
12500	86.8	86.3	85.2	83.3	83.8	75.8	84.0
16000	86.1	85.2	84.2	82.2	82.7	74.6	82.5
20000	85.4	84.8	83.5	81.8	81.9	73.8	81.6

Table E.2: M109 at approximately 245 m, measured data without ground correction. Angles are in the horizontal plane.

F Free field M109, 10 m ref, uniform angles.

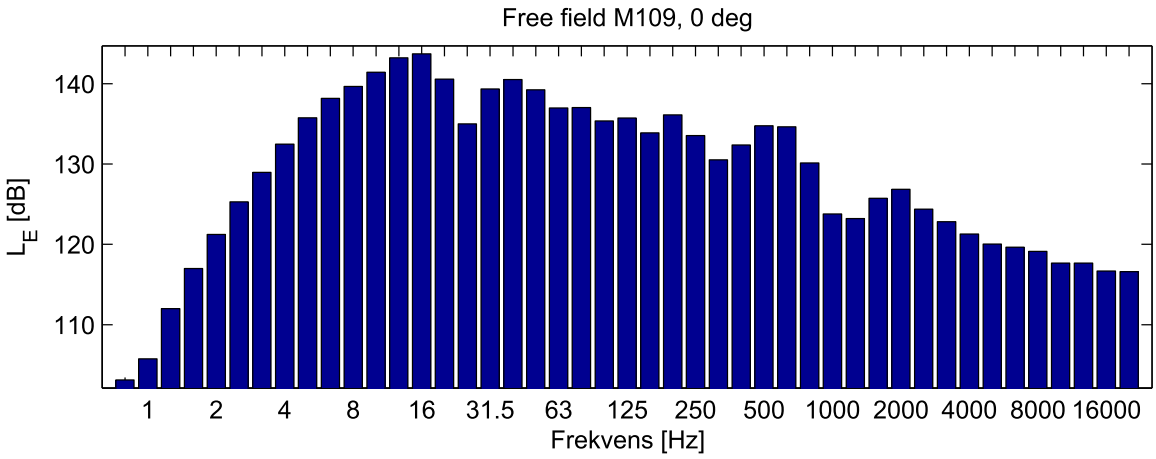


Figure F.1: Free field M109, reference level at 10 m, 0 degrees (horizontal) from the firing direction.

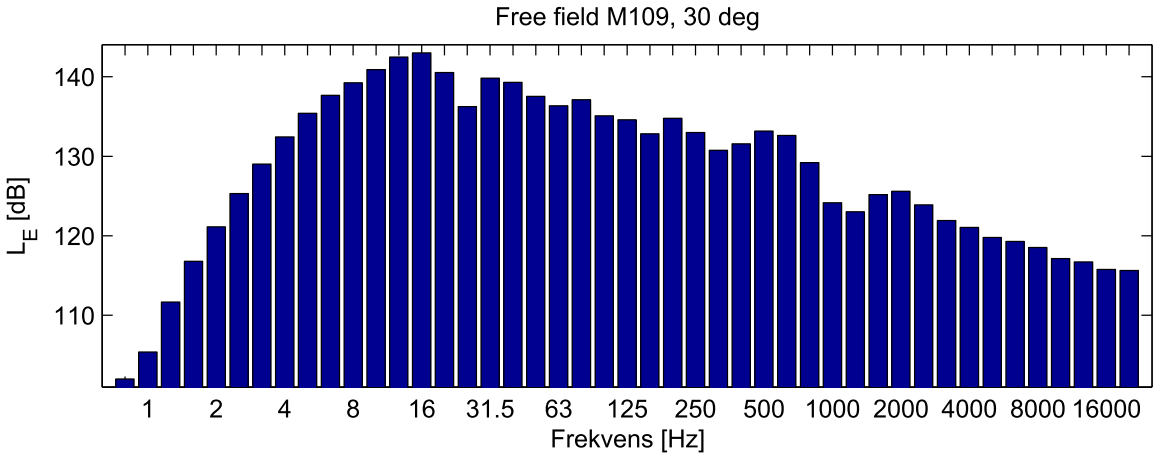


Figure F.2: Free field M109, reference level at 10 m, 30 degrees (horizontal) from the firing direction.

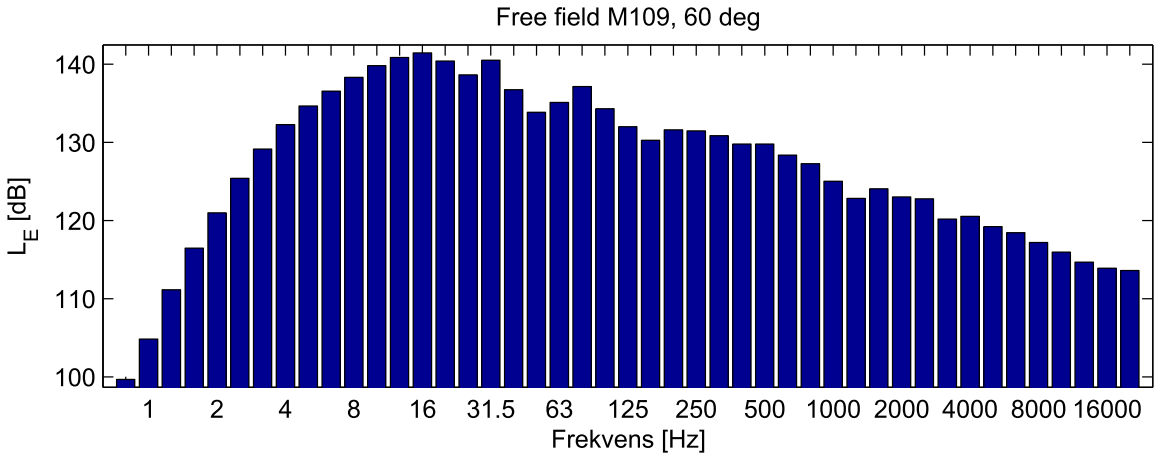


Figure F.3: Free field M109, reference level at 10 m, 60 degrees (horizontal) from the firing direction.

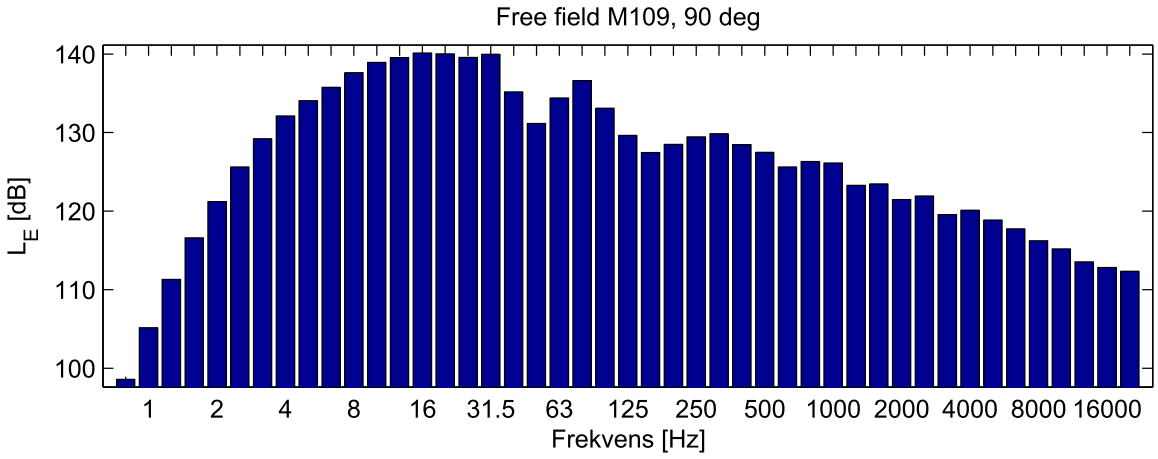


Figure F.4: Free field M109, reference level at 10 m, 90 degrees (horizontal) from the firing direction.

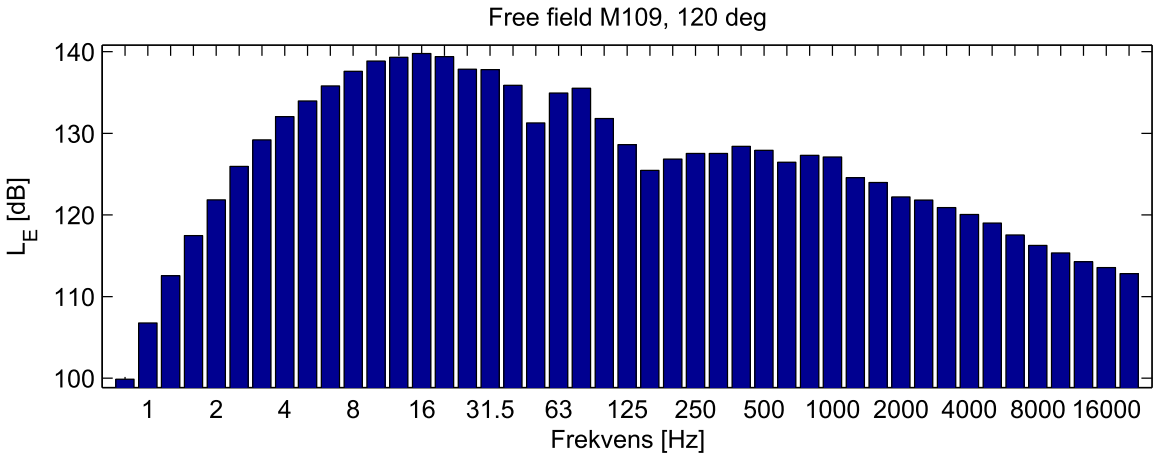


Figure F.5: Free field M109, reference level at 10 m, 120 degrees (horizontal) from the firing direction.

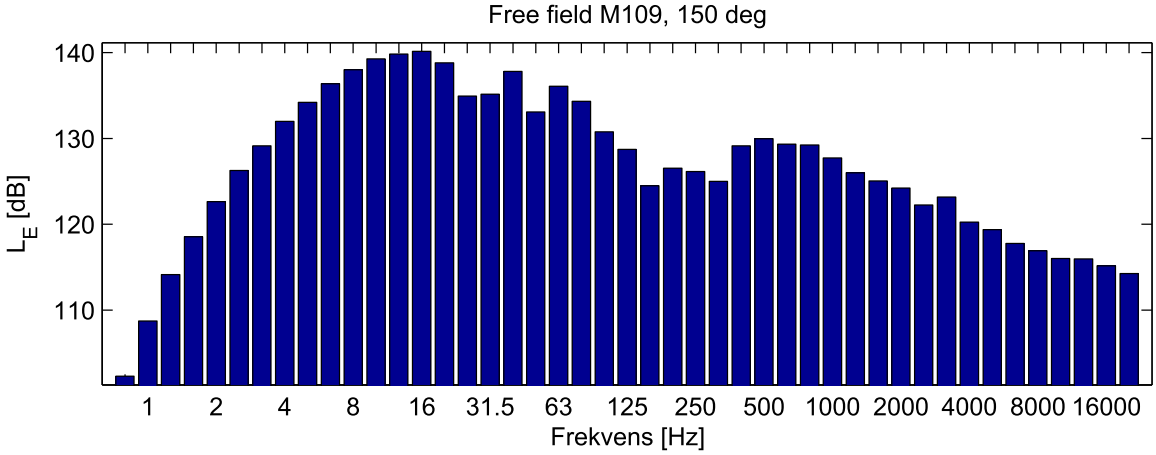


Figure F.6: Free field M109, reference level at 10 m, 150 degrees (horizontal) from the firing direction.

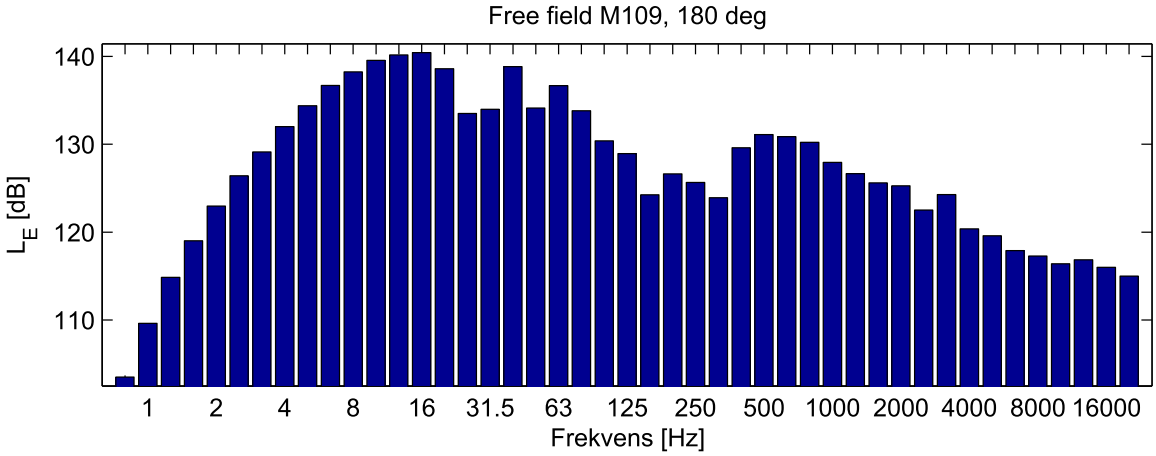


Figure F.7: Free field M109, reference level at 10 m, 180 degrees (horizontal) from the firing direction.

Freq	0 deg	30 deg	60 deg	90 deg	120 deg	150 deg	180 deg
Sum	152.1	151.5	150.5	149.7	149.1	149.2	149.4
0.8	103.1	102.0	99.7	98.6	99.9	102.3	103.5
1	105.7	105.4	104.8	105.2	106.8	108.7	109.6
1.25	112.0	111.7	111.1	111.3	112.6	114.1	114.8
1.6	117.0	116.8	116.5	116.6	117.5	118.5	119.0
2	121.2	121.1	121.0	121.2	121.9	122.6	123.0
2.5	125.3	125.3	125.4	125.6	125.9	126.3	126.4
3.15	129.0	129.0	129.1	129.2	129.2	129.2	129.1
4	132.5	132.4	132.3	132.1	132.0	132.0	132.0
5	135.8	135.4	134.7	134.1	134.0	134.2	134.4
6.3	138.2	137.7	136.6	135.8	135.8	136.4	136.7
8	139.7	139.2	138.3	137.6	137.6	138.0	138.2
10	141.4	140.9	139.8	138.9	138.8	139.3	139.5
12.5	143.2	142.5	140.8	139.5	139.3	139.8	140.2
16	143.7	143.0	141.4	140.1	139.8	140.2	140.4
20	140.6	140.5	140.4	140.0	139.4	138.8	138.6
25	135.0	136.2	138.6	139.6	137.9	134.9	133.5
31.5	139.4	139.8	140.5	140.0	137.8	135.2	134.0
40	140.5	139.3	136.7	135.2	135.9	137.8	138.8
50	139.3	137.5	133.8	131.2	131.3	133.1	134.1
63	137.0	136.4	135.1	134.4	134.9	136.1	136.7
80	137.0	137.1	137.1	136.6	135.5	134.3	133.8
100	135.4	135.1	134.3	133.1	131.8	130.8	130.4
125	135.7	134.6	132.0	129.6	128.6	128.7	128.9
160	133.9	132.8	130.3	127.5	125.5	124.5	124.3
200	136.1	134.8	131.6	128.5	126.8	126.5	126.6
250	133.5	133.0	131.5	129.5	127.5	126.1	125.7
315	130.5	130.7	130.8	129.8	127.5	125.0	123.9
400	132.4	131.6	129.8	128.5	128.4	129.1	129.6
500	134.8	133.2	129.8	127.5	127.9	130.0	131.1
630	134.7	132.6	128.4	125.6	126.5	129.3	130.9
800	130.2	129.2	127.3	126.3	127.3	129.2	130.2
1000	123.8	124.1	125.0	126.1	127.1	127.7	127.9
1250	123.2	123.0	122.8	123.3	124.6	126.0	126.6
1600	125.7	125.2	124.1	123.5	124.0	125.1	125.6
2000	126.9	125.6	123.0	121.5	122.2	124.2	125.3
2500	124.4	123.9	122.8	121.9	121.8	122.3	122.5
3150	122.8	121.9	120.2	119.5	120.9	123.2	124.3
4000	121.3	121.1	120.5	120.1	120.1	120.2	120.4
5000	120.0	119.8	119.2	118.9	119.0	119.4	119.6
6300	119.7	119.3	118.4	117.7	117.6	117.8	117.9
8000	119.1	118.5	117.2	116.2	116.3	116.9	117.3
10000	117.7	117.1	116.0	115.2	115.3	116.0	116.4
12500	117.7	116.7	114.7	113.5	114.3	116.0	116.8
16000	116.7	115.8	113.9	112.8	113.5	115.2	116.0
20000	116.6	115.6	113.6	112.4	112.8	114.3	115.0

Table F.1: Free field 1/3-octave SEL-spectrum for M109, 10 m reference level, uniform angular segments .

G Errors found in FFI-rapport 2007/01450

During the work with this report, some errors were detected in the report containing the raw data, FFI-rapport 2007/01450 [11].

- Page 32, caption for Figure F.1: “shot nr. 3” should be “shot nr. 4”.
- Page 15, Table 4.2: Angle to firing direction is wrong. This angle is calculated from the horizontal angle and the elevations angle the weapon. The wrong angles are also given in the plots and tables in Appendices A–E in [11]. The correct angles are given in Table 4.1 in this report.

H Emisiondata for MILSTØY

Data til MilstoeyII:
Vaapen: M109A3GN (155 mm felthaubits), navn: Didrik.
Elevasjon 18.7 grader.
Ammunisjon: 5 moduler DM72 (maks), DM662.
Maaling: 21 Sept. 2007, Hjerkinn (Turrhaugen).
Versjon kildedata: 1
Dokumentasjon: FFI-rapport 2007/01450 og FFI-rapport 2007/02530.

Det er 45 1/3-oktavbaand fra 0.8 Hz til 20 kHz senterfrekvens.
Senterfrekvensene er (Hz):
0.80 1.00 1.25 1.60 2.00 2.50 3.15 4.00 5.00 6.30 8.00 10.00 12.50 16.00 20.00
25.00 31.50 40.00 50.00 63.00 80.00 100.00 125.00 160.00 200.00 250.00 315.00
400.00 500.00 630.00 800.00 1000.00 1250.00 1600.00 2000.00 2500.00 3150.00
4000.00 5000.00 6300.00 8000.00 10000.00 12500.00 16000.00 20000.00
Det er maalinger i 7 retninger (grader):
0.00 30.00 60.00 90.00 120.00 150.00 180.00

Foelgende skal inn i KILDENIVAA i Milstoey:
SEL L Lls Lfast Limp
1 150.26 150.26 159.26 164.86

Foelgende skal inn i DIREKTIVITET i Milstoey:
1.84 0.69 -1.59 -2.67 -1.40 1.03 2.23 1.03 -1.40 -2.67 -1.59 0.69 1.84
-1.03 -1.39 -1.93 -1.59 0.01 1.97 2.86 1.97 0.01 -1.59 -1.93 -1.39 -1.03
-0.57 -0.90 -1.43 -1.24 -0.01 1.57 2.28 1.57 -0.01 -1.24 -1.43 -0.90 -0.57
-0.42 -0.63 -0.95 -0.78 0.07 1.14 1.62 1.14 0.07 -0.78 -0.95 -0.63 -0.42
-0.47 -0.58 -0.72 -0.51 0.15 0.92 1.27 0.92 0.15 -0.51 -0.72 -0.58 -0.47
-0.46 -0.44 -0.36 -0.14 0.20 0.52 0.66 0.52 0.20 -0.14 -0.36 -0.44 -0.46
-0.16 -0.11 0.00 0.08 0.08 0.03 -0.00 0.03 0.08 0.08 0.00 -0.11 -0.16
0.30 0.24 0.09 -0.06 -0.16 -0.19 -0.20 -0.19 -0.16 -0.06 0.09 0.24 0.30
1.15 0.81 0.05 -0.55 -0.64 -0.39 -0.23 -0.39 -0.64 -0.55 0.05 0.81 1.15
1.52 0.99 -0.12 -0.92 -0.87 -0.30 0.02 -0.30 -0.87 -0.92 -0.12 0.99 1.52
1.33 0.90 -0.03 -0.73 -0.75 -0.34 -0.10 -0.34 -0.75 -0.73 -0.03 0.90 1.33
1.64 1.12 -0.01 -0.87 -0.95 -0.52 -0.26 -0.52 -0.95 -0.87 -0.01 1.12 1.64
2.39 1.65 0.01 -1.29 -1.52 -1.00 -0.67 -1.00 -1.52 -1.29 0.01 1.65 2.39
2.41 1.69 0.11 -1.21 -1.55 -1.17 -0.90 -1.17 -1.55 -1.21 0.11 1.69 2.41
0.73 0.70 0.55 0.16 -0.45 -1.03 -1.27 -1.03 -0.45 0.16 0.55 0.70 0.73
-2.32 -1.09 1.28 2.23 0.53 -2.40 -3.82 -2.40 0.53 2.23 1.28 -1.09 -2.32
0.56 1.02 1.68 1.16 -1.01 -3.65 -4.84 -3.65 -1.01 1.16 1.68 1.02 0.56

2.76 1.52 -1.04 -2.59 -1.89 0.05 1.06 0.05 -1.89 -2.59 -1.04 1.52 2.76
4.42 2.70 -1.01 -3.67 -3.57 -1.75 -0.71 -1.75 -3.57 -3.67 -1.01 2.70 4.42
1.28 0.66 -0.61 -1.29 -0.77 0.38 0.97 0.38 -0.77 -1.29 -0.61 0.66 1.28
0.86 0.94 0.95 0.44 -0.67 -1.86 -2.37 -1.86 -0.67 0.44 0.95 0.94 0.86
2.03 1.75 0.96 -0.23 -1.54 -2.57 -2.96 -2.57 -1.54 -0.23 0.96 1.75 2.03
3.91 2.78 0.19 -2.19 -3.21 -3.10 -2.88 -3.10 -3.21 -2.19 0.19 2.78 3.91
4.23 3.19 0.62 -2.18 -4.19 -5.15 -5.39 -5.15 -4.19 -2.18 0.62 3.19 4.23
4.68 3.33 0.15 -2.94 -4.59 -4.90 -4.81 -4.90 -4.59 -2.94 0.15 3.33 4.68
3.15 2.59 1.08 -0.93 -2.87 -4.24 -4.74 -4.24 -2.87 -0.93 1.08 2.59 3.15
1.38 1.59 1.69 0.69 -1.62 -4.15 -5.25 -4.15 -1.62 0.69 1.69 1.59 1.38
2.43 1.62 -0.15 -1.47 -1.54 -0.79 -0.35 -0.79 -1.54 -1.47 -0.15 1.62 2.43
3.91 2.29 -1.11 -3.40 -2.96 -0.90 0.22 -0.90 -2.96 -3.40 -1.11 2.29 3.91
4.48 2.45 -1.81 -4.55 -3.72 -0.85 0.67 -0.85 -3.72 -4.55 -1.81 2.45 4.48
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-2.44 -2.10 -1.21 -0.10 0.86 1.48 1.69 1.48 0.86 -0.10 -1.21 -2.10 -2.44
-1.12 -1.30 -1.49 -1.04 0.23 1.68 2.32 1.68 0.23 -1.04 -1.49 -1.30 -1.12
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1.34 0.96 0.12 -0.59 -0.76 -0.56 -0.42 -0.56 -0.76 -0.59 0.12 0.96 1.34
1.80 1.19 -0.14 -1.09 -1.07 -0.42 -0.06 -0.42 -1.07 -1.09 -0.14 1.19 1.80
1.48 0.93 -0.22 -0.99 -0.85 -0.16 0.21 -0.16 -0.85 -0.99 -0.22 0.93 1.48
2.07 1.08 -0.93 -2.07 -1.35 0.36 1.23 0.36 -1.35 -2.07 -0.93 1.08 2.07
1.91 0.99 -0.89 -1.93 -1.23 0.39 1.22 0.39 -1.23 -1.93 -0.89 0.99 1.91
2.31 1.34 -0.68 -1.93 -1.47 -0.04 0.71 -0.04 -1.47 -1.93 -0.68 1.34 2.31

Foelgende skal inn i SPEKTER i Milstoey:
-49.00 -43.50 -37.70 -32.86 -28.55 -24.51 -21.14 -18.07 -15.65 -13.59 -11.91
-10.46 -9.42 -8.93 -10.41 -12.93 -11.45 -12.49 -15.42 -14.55 -14.08 -16.92
-18.44 -20.61 -18.82 -19.87 -21.10 -20.32 -19.38 -20.08 -21.80 -24.02 -25.93
-25.62 -26.15 -27.49 -28.45 -29.77 -30.90 -31.94 -32.93 -34.08 -34.65 -35.49
-35.97

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APPENDIX E – 2022 BALLISTICS TEST RANGE SOUND ANALYSES SCOPE OF WORK

H2H GEOSCIENCE ENGINEERING

179 River Street, Troy, New York 12180

Environmental Professionals
Geologic Consultants
Construction Services

(518) 270-1620/Fax (518) 270-1672

November 9, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analysis at the above reference site.

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following Scope of Work (SOW).

Scope of Work

H2H intends to collect ambient (no unapproved UCI operations taking place) sound levels, as well has additional sound level modeling to support a revised sound study, to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application.

Task 1: Sound Level Monitoring

H2H has developed a Site Overview Map (Figure 1) showing all identified receptors within a two-mile radius (Project Area) of the ballistics testing Firing Pad. The Firing Pad (100 ft. by 100 ft.) is in the northeast corner of parcel 38.1-1-31.000 (UCI Site). The Control Operations Area is located adjacent to the Firing Pad; the Target Area is located 590 ft. west of the Firing Pad (Figure 2).

Forty-two Residential Receptors (occupied residential structure) were identified with the two-mile radius. Four parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius.

Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Firing Pad to best determine ambient sound level conditions in the Project Area. H2H will conduct sound level monitoring at each of the identified five-monitoring location (Figure 1) to identify, and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for the area surrounding each monitoring location.

The following is a description of each sound monitoring location:

M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-2 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surround Pulsifer Rd.

M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

M-4 - Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Task 2: Sound Level Modeling

Based on source sound level data (loudest kinetic systems to be tested) provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURES

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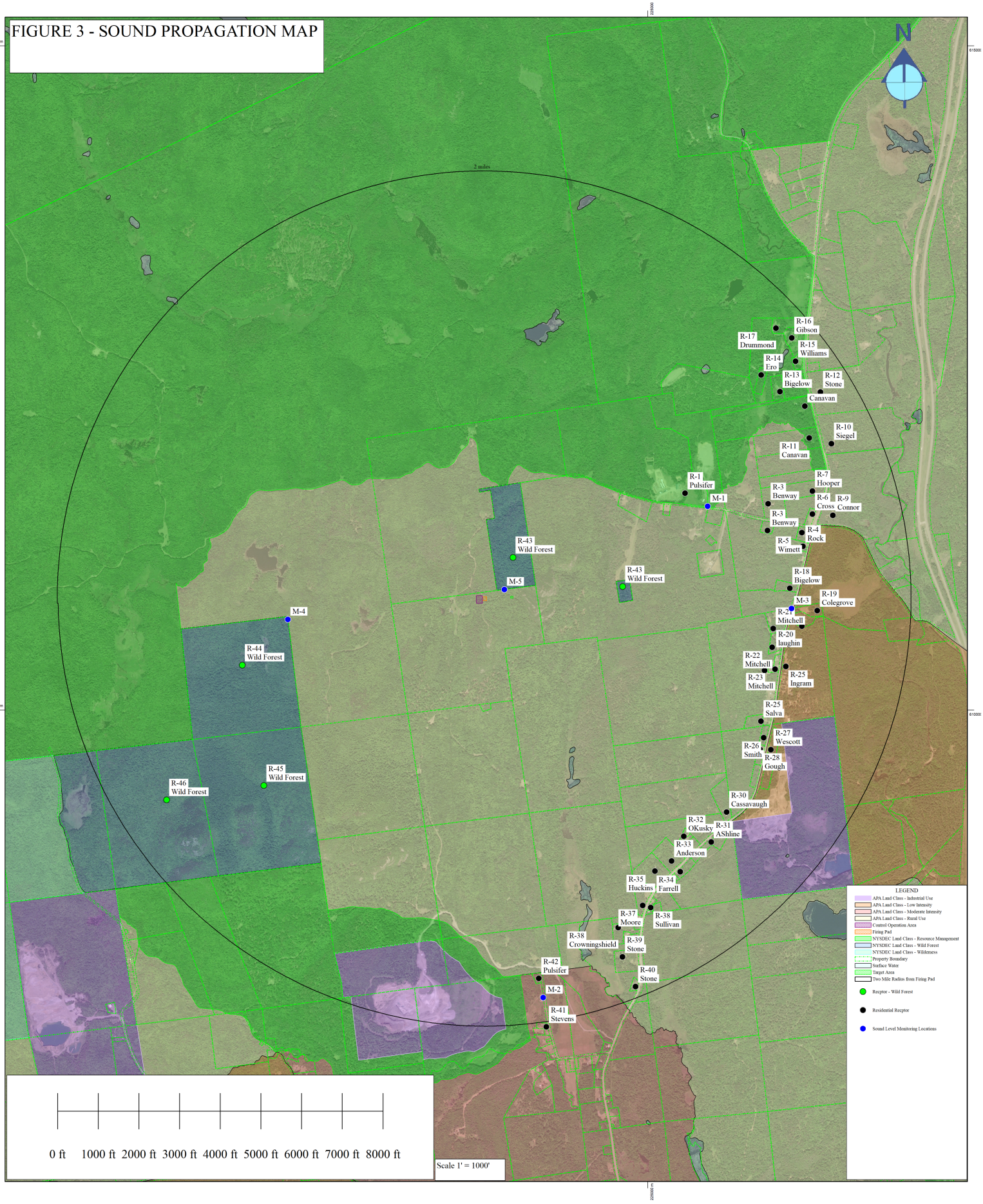
FIGURE 3 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
M-1
R-7 Hooper
R-3 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
R-43 Wild Forest
M-5
R-18 Bigelow
M-3
R-19 Colegrove
R-21 Mitchell
R-20 laughin
R-22 Mitchell
R-23 Mitchell
R-25 Ingram
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
M-4
R-44 Wild Forest
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-42 Pulsifer
R-40 Stone
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Recptor - Wild Forest
Residential Recptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1' = 1000'

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FIGURE - 2 SITE MAP



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4th NIPA

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FOURTH NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions Testing Facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submissions in relation to APA Project No. 2021-0276, received by the Agency on February 28 and March 1, 2023. The submissions provided important information in response to the Agency's June 6, 2022 Third Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's June 6, 2022 Third NIPA, the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the June 6, 2022 Third Notice of Incomplete Permit Application was not submitted and is required to review the application.

You will receive a Notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

March 16, 2023
Date

/s/John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to Frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. **January 13, 2022 Notice of Incomplete Permit Application (NIPA) Item 1:** Please clarify if safety signage will be placed on the property and update the Site Plan accordingly.

2. **January 13, 2022 NIPA Item 4:** The proposed maximum noise source in the Sound Study prepared by H2H Geoscience Engineering is a howitzer M109A3GN (155 mm), with a corresponding maximum sound level of 176 dBA measured at 820 feet. The provided noise source information is from a 45-page report titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defense Research Establishment (FFI), dated 5 December 2007. The introduction of the report states that "M109 is one of the noisiest weapons in the Norwegian defense, and as such represents a limiting factor for activity at firing ranges and training fields." The study is based upon utilizing a detonation of 1 kg of TNT 35 meters (114 feet) from the source location of a howitzer with calculations for ground correction, meteorological variances and other factors. The author of the report repeatedly admits that, to their knowledge, there is no consensus or commonly accepted method to produce free field emission data for firing large weapons close to the ground.

   The provided noise source for this proposal is therefore questionable absent other supporting noise data, and the sound pressure level utilized in the provided model input is 176 dBA, which is a corrected measurement from 250 meters or 820 feet away. The actual noise level in proximity to the source, i.e. at the howitzer muzzle, is unknown, but presumably significantly louder. Therefore, the provided noise assessment is based upon a model input of 176 dBA which is 820 feet away from the noise source, skewing or significantly reducing the model output results.

   The provided noise assessment and model need to account for this major discrepancy. For instance, the noise monitoring location M-5, which is state land classified as Wild Forest, is located 510 feet from the 100 foot by 100 foot gravel firing pad noise source, which is less than 820 feet away, but the modeled output sound level is 107 dBA. Utilizing the same 176 dBA at 820 feet, the estimated noise level at M-5 located at 510 feet, which is 310 feet closer, would be greater than 176 dBA, not less.

   Given these discrepancies and absent additional supporting information, the provided noise assessment is unacceptable. Please also refer to the previous Agency correspondence requests for significant revisions to the proposal. Please address the following:

   - The provided response regarding the use of tanks or armored machinery for transport or testing is inadequate. The provided noise assessment report states that all test equipment and instrumentation will be portable and will be removed from the site at the end of test, with no more than 3 tests per month, and each test will consist of 4 – 5 shots. The provided Norwegian noise source study states that M109 is a 155 mm howitzer that is placed on an armored tracked vehicle. Per NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts, please

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provide a more complete noise assessment that includes all sources of noise generation, including fixed and mobile equipment (armored and unarmored) and transport movements of materials including testing and instrumentation.

- In order to support the provided sound propagation model outputs, please revise the noise source level for a sound pressure level at or in proximity to the howitzer muzzle noise source (not 820 feet away) and also provide empirical sound pressure level calculations for each of the receptor locations, M-1 through M-5, and provide an impact assessment utilizing these calculations in comparison to each monitoring locations provided measured ambient sound level.

- The provided noise assessment does not include or factor in varying weather conditions, changes in wind direction and speed, temperature and humidity and atmospheric inversions. Please revise to evaluate changes in weather as per NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts.

3. **January 13, 2022 NIPA Item 5:** The provided response and Sound Study from H2H does not address additional sound mitigation measures. Until an acceptable full noise assessment has been provided, the Agency cannot assess whether the currently proposed public notification and mitigation is adequate.

4. **Project discrepancies:** There are several discrepancies regarding the proposal in the materials submitted to date, including but not limited to:

   - In the initial project proposal, received by the Agency November 19, 2021, the project is described as "…No more than three tests per month are anticipated. Each test will consist of 1 – 3 shots, and each series of shots will last no more than 2 days. These tests are anticipated to continue for a period of 5 years, with an average of no more than 30 shots per year." The Sound Study prepared by H2H Geoscience Engineering, received by the Agency March 1, 2023, describes the project as "No more than three tests per month are anticipated. Each test will consist of four-five shots, and each series of shots will last no more than two days…". Please clarify the maximum number of shots proposed per day.

   - The "Noise emission data for M109, 155 mm field howitzer" study referenced in the Sound Study prepared by H2H references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency July 18, 2022 reference the sound level for a M4A2 zone 7 charge. How do the two charges compare and what effect will they have on the level of sound produced? What is the maximum charge proposed to be used during testing?

Please provide an updated, consolidated project description and plan that accurately reflects the current project proposal and eliminates these and all other changes and discrepancies. Please also revise the Site Plan so that the size and scale of the Firing Pad is accurately depicted.

cc: Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
318 James Pulsifer, landowner

4th NIPA (July Response)

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NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: August 1, 2023

NORFOLK BEIER PLLC
ATTORNEYS AT LAW

July 31, 2023

VIA EMAIL ONLY:frederick.aldinger@apa.ny.gov
Mr. Frederick W. Aldinger, III
NYS Adirondack Park Agency
P.O. Box 99
1133 NYS Route 86
Ray Brook, NY 12977

Re: Project Sponsor: Michael Hopmeier, Unconventional Concepts Incorporated ("UCI")
APA Project No. 2021-0276
Ballistic Range

Greetings:

Please find enclosed UCI's Response to the Fourth Notice of Incomplete Permit Application for the APA Project No. 2021-0276 for your consideration.

If you have any questions or concerns, please do not hesitate to contact us.

Sincerely,

Norfolk Beier PLLC



By:
Matthew D. Norfolk, Esq.

MDN:mbm
Enc.
cc: Mr. Michael Hopmeier (w/enc.)(Via Email Only)
Ms. Lori Settle (w/enc.)(Via Email Only)

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UCI'S RESPONSE TO FOURTH NIPA

New York State Adirondack Park Agency

KATHY HOCHUL
Governor

BARBARA RICE
Executive Director

FOURTH NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021 **Type of Project**: Commercial Use – Munitions Testing Facility **Location of Project:** Town of Lewis, Essex County, Land Use Area: Rural Use, Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submissions in relation to APA Project No. 2021-0276, received by the Agency on February 28 and March 1, 2023. The submissions provided important information in response to the Agency's June 6, 2022 Third Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's June 6, 2022 Third NIPA, the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the June 6, 2022 Third Notice of Incomplete Permit Application was not submitted and is required to review the application.

You will receive a Notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

March 16, 2023
Date

/s/John M. Burth
John M. Burth
Environmental Program Specialist 3
(EPS3)

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to Frederick.aldinger@apa.ny.gov All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. **January 13, 2022 Notice of Incomplete Permit Application (NIPA) Item** Please clarify if safety signage will be placed on the property and update the Site Plan accordingly.

RESPONSE: Safety signage will be posted on the property. Figure 2 (attached) has been modified to reflect the placement of signage.

2. **January 13, 2022 NIPA Item 4:** The proposed maximum noise source in the Sound Study prepared by H2H Geoscience Engineering is a howitzer M109A3GN (155 mm), with a corresponding maximum sound level of 176 dBA measured at 820 feet. The provided noise source information is from a 45-page report titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defense Research Establishment (FFI), dated 5 December 2007. The introduction of the report states that "M109 is one of the noisiest weapons in the Norwegian defense, and as such represents a limiting factor for activity at firing ranges and training fields." The study is based upon utilizing a detonation of 1 kg of TNT 35 meters (114 feet) from the source location of a howitzer with calculations for ground correction, meteorological variances and other factors. The author of the report repeatedly admits that, to their knowledge, there is no consensus or commonly accepted method to produce free field emission data for firing large weapons close to the ground.

The provided noise source for this proposal is therefore questionable absent other supporting noise data, and the sound pressure level utilized in the provided model input is 176 dBA, which is a corrected measurement from 250 meters or 820 feet away. The actual noise level in proximity to the source, i.e. at the howitzer muzzle, is unknown, but presumably significantly louder. Therefore, the provided noise assessment is based upon a model input of 176 dBA which is 820 feet away from the noise source, skewing or significantly reducing the model output results.

The provided noise assessment and model need to account for this major discrepancy. For instance, the noise monitoring location M-5, which is state land classified as Wild Forest, is located 510 feet from the 100 foot by 100 foot gravel firing pad noise source, which is less than 820 feet away, but the modeled output sound level is 107 dBA. Utilizing the same 176 dBA at 820 feet, the estimated noise level at M-5 located at 510 feet, which is 310 feet closer, would be greater than 176 dBA, not less.
Given these discrepancies and absent additional supporting information, the provided noise assessment is unacceptable. Please also refer to the previous

Agency correspondence requests for significant revisions to the proposal. Please address the following:

RESPONSE:

Sound Source sound level used in analyses performed by H2H Geoscience Engineering ("H2H") is without ground corrections. Uncorrected data has a higher sound pressure level than corrected data providing a conservative (*i.e.*, potentially louder) sound level model (*see* Appendix E, Table E.1, free field, *compared to* Table E.2, without ground correction).

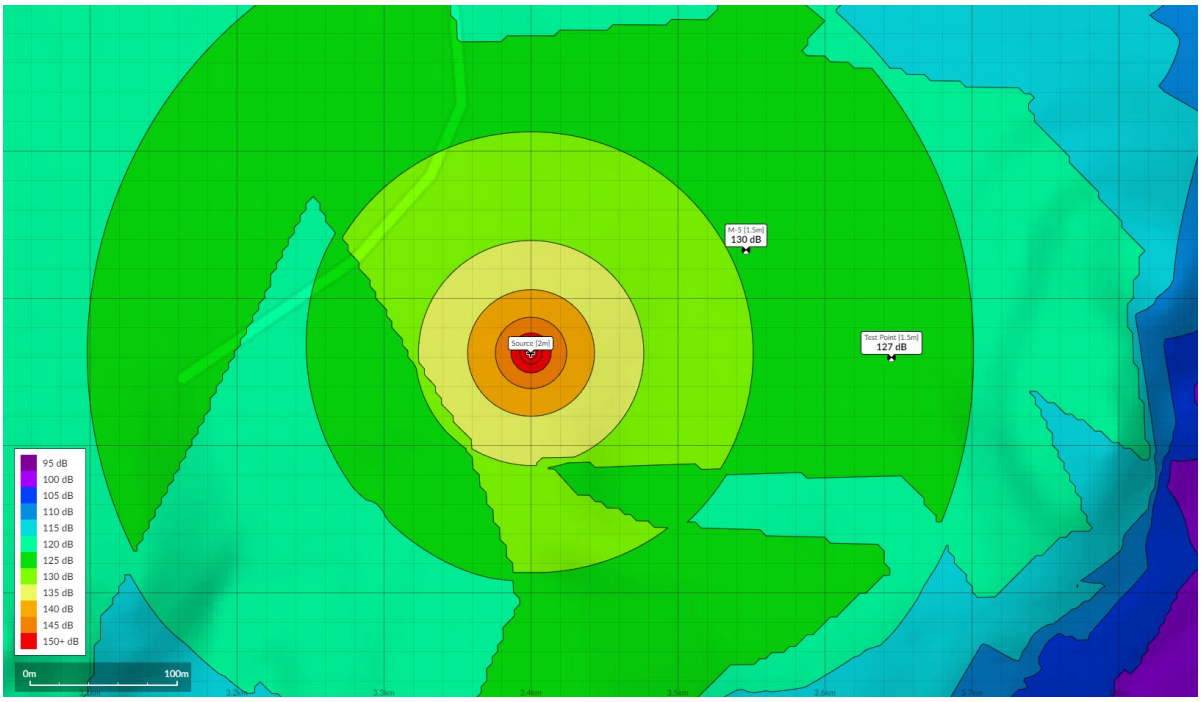
The goal of the analyses was to develop data that could be used to model the attenuation of sound produced by a howitzer due to the previous lack of available information. The results of the Norwegian Defense Research Establishments (FFI) study demonstrated correlation with their recorded sound levels from the field (data used in H2H's analyses) and proved to be suitable for use in the FFI database.

The Source sound power level was transcribed incorrectly in the H2H February 2023 Sound Study Report. Source sound power level is 180.8 dB (163.2 dB(A)) not 175.9 dB.

The sound power level of the Source was calculated based on the sound pressure levels shown in Table E.2 of Appendix E (Noise Emission Data for M109, 155mm Field Howitzer). The sound pressure levels shown in Table E.2 were measured at 245 meters from the sound source by seven sensor positions at increasing angles from the direction of fire. Sensor 1 is positioned 32 degrees from the direction of fire and recorded a sound pressure level of 130.5 dB (loudest recorded sound level across the seven sensors) at 245 meters. The data shown in Table E.2 was produced taking the average of 15 shots. Using industry standard calculations, the sound power level at the sound source (barrel of the M109, 155mm howitzer) was calculated to be 180.8 dB (163.2 dB(A)).

Figure 5 demonstrates the accuracy of the sound propagation model. Figure 5 shows the modeled sound pressure level (not A-weighted) at M-5 (same location as shown on Figure 3) and a receiver located 245 meters west of the source labeled "Test Point." The sound source (barrel of the M109, 155mm howitzer (180.8 dB), and all model parameters are unchanged. The Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB which correlates within ISO standards.

Figure 5



- The provided response regarding the use of tanks or armored machinery for transport or testing is inadequate. The provided noise assessment report states that all test equipment and instrumentation will be portable and will be removed from the site at the end of test, with no more than 3 tests per month, and each test will consist of 4 – 5 shots. The provided Norwegian noise source study states that M109 is a 155 mm howitzer that is placed on an armored tracked vehicle. Per NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts, please provide a more complete noise assessment that includes all sources of noise generation, including fixed and mobile equipment (armored and unarmored) and transport movements of materials including testing and instrumentation.

RESPONSE:

- A shot will only be fired on weekdays between the hours 10:00 AM and 4:00 PM.

- A maximum of two shots will be fired in one day.

- Shots may be fired a maximum of three consecutive days.

- A diesel truck similar to what has historically operated on site in support of logging activities will be used to transport the 155 mm howitzer barrel assembly to and from the Firing Pad area. In addition to the 155 mm howitzer, a diesel truck will be used to transport the 155 mm howitzer and monitoring equipment to the Firing Pad and Support Area. Figure 4 shows the modeled sound pressure level of the diesel truck (40-ton haul truck with a sound power level of 115.7 dB(A)

- Figure 4 shows the modeled, A-weighted sound pressure level for a 40-ton Haul Truck operating on the site access rd.

- Model results show no impact at receptors from diesel truck traffic.

- In order to support the provided sound propagation model outputs, please revise the noise source level for a sound pressure level at or in proximity to the howitzer muzzle noise source (not 820 feet away) and also provide empirical sound pressure level calculations for each of the receptor locations, M-1 through M-5, and provide an impact assessment utilizing these calculations in comparison to each monitoring locations provided measured ambient sound level.

RESPONSE: The February 2023 H2H Sound Study report, in Table 1a and Table 1b, provides the recorded ambient, modeled impulse sound level, modeled ambient and change from recorded ambient sound level.

- The provided noise assessment does not include or factor in varying weather conditions, changes in wind direction and speed, temperature and humidity and atmospheric inversions. Please revise to evaluate changes in weather as
per NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts.

RESPONSE: The February 2023 model accounts for appropriate weather conditions following ISO 9613-2 Specifications Including:

- Moderate downwind propagation defined as a wind direction within an arc of 90 degrees with the wind blowing from the source.

- Wind speeds up to 5 m/s measured 3-11 meters above the ground.

- A moderate ground-based temperature inversion.

3. January 13, 2022 NIPA Item 5: The provided response and Sound Study from H2H does not address additional sound mitigation measures. Until an acceptable full noise assessment has been provided, the Agency cannot assess whether the currently proposed public notification and mitigation is adequate.

RESPONSE: The location of the Firing Pad is a mitigation measure. The Firing Pad, within the Property was specifically located so that there was a large topographic divide between residential receptors and the noise source. There are no other practicable means to mitigate noise from a noise source such as the one being tested. Additionally, the projectile will be captured within a "soft" feature that further reduces any noise being produced during testing. These combined mitigation measures represent the greatest possible mitigation strategy for this project.

4. Project discrepancies: There are several discrepancies regarding the proposal in the materials submitted to date, including but not limited to:

- In the initial project proposal, received by the Agency November 19, 2021, the project is described as "…No more than three tests per month are anticipated. Each

test will consist of 1 – 3 shots, and each series of shots will last no more than 2 days. These tests are anticipated to continue for a period of 5 years, with an average of no more than 30 shots per year." The Sound Study prepared by H2H Geoscience Engineering, received by the Agency March 1, 2023, describes the project as "No more than three tests per month are anticipated. Each test will consist of four-five shots, and each series of shots will last no more than two days…". Please clarify the maximum number of shots proposed per day.

RESPONSE:

- A maximum of two shots will be fired in one day.

- Shots may be fired a maximum of three consecutive days.

- The "Noise emission data for M109, 155 mm field howitzer" study referenced in the Sound Study prepared by H2H references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency July 18, 2022 reference the sound level for a M4A2 zone 7 charge. How do the two charges compare and what effect will they have on the level of sound produced? What is the maximum charge proposed to be used during testing?

RESPONSE: The level of sound for all charge sizes employed will not exceed those acceptable levels determined by H2H's assessments and testing.

Please provide an updated, consolidated project description and plan that accurately reflects the current project proposal and eliminates these and all other changes and discrepancies. Please also revise the Site Plan so that the size and scale of the Firing Pad is accurately depicted.

RESPONSE: Sound Study has been revised to reflect the above information. The Site Map (Figure 2) of H2H's February 2023 Sound Study report is scaled to 1 in. = 100 ft.

cc: Michael Hopmeier
Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Michael Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

July 2023 - Sound Study

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SOUND STUDY

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: August 1, 2023

UNCONVENTIONAL CONCEPTS, INC.

APA PROJECT #2021-0276

Prepared for:
Unconventional Concepts, Inc.
620 Herndon Parkway, Suite 120A
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July 2023

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1.0 INTRODUCTION

Unconventional Concepts, Inc. (UCI) has proposed to the Adirondack Park Agency (APA), an application for the operation of a projectile testing range in Lewis, New York. The range (Site) is at 195 Hale Hill Lane (Figure 1). H2H Geoscience Engineering, PLLC (H2H) prepared this report to identify and evaluate the potential impacts of off-site sound propagation from the proposed application. The potential sound impacts associated with the application were assessed in accordance with the requirements set forth by the Adirondack Park Agency (APA) and the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT BACKGROUND

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. The range will be developed to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance.

This effort will focus on the test and evaluation of these new systems in support of a critical US Army research program managed by Benét Laboratories at Watervliet Arsenal in Albany, NY. The project will focus on the instrumentation and firing of these systems in a constrained area to allow for measurement and assessment of the internal ballistics and kinetic and kinematic effects of these modern designs.

All test equipment and instrumentation will be portable; equipment will be deployed as needed to the Site for a test and will then be completely removed at the end of the test.

The testing schedule is as follows:

- A shot will only be fired on weekdays between the hours of 10:00 AM and 4:00 PM.
- A maximum of two shots will be fired in one day.
- Shots will be fired a maximum of three consecutive days.
- Testing is anticipated to continue for a period of five years, with an average of 30 shots per year.

The Site is on land owned by Pulsifer Logging, LLC (38.1-1-31.000). UCI is using the land with the landowner's (written) permission. The Sound Source (155 mm howitzer barrel assembly) will be located on a 100 ft. X 100 ft. crushed gravel pad (Firing Pad). A haul truck will be used to transport the barrel assembly to the firing pad. The Operations Control Area is adjacent to the Firing Pad; the Target Area is 590 ft. east of the Firing Pad (Figure 2). The 155 mm howitzer barrel assembly and the Haul Truck are the only sources of sound that could produce a potential signific environmental impact associated with the project.

The Site is accessed via an access road off Hale Hill Road. The area surrounding the Site is heavily forested with a topographic high to the east and south. NYS Route 9 is located approximately 7,000 ft. to the east.

Within a two-mile radius of the site (Project Area) forty-two Residential Receptors (RR) were identified. The closest RR is the Pulsifer residents (R-1) 5,200 ft. to the northeast off Hale Hill Road. Five parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius (Figure 1).

H2H developed a Scope of Work (SOW) approved by the APA specifying the locations sound level monitoring was conducted. The SOW incorporating the APA's November 28, 2022 comments on the location of Monitoring location M-3 and M-4 is attached as Appendix E.

3.0 SOUND LEVEL MONITORING

Sound level monitoring was conducted by H2H on December 20, 2022, and December 21, 2022. Monitoring was conducted at the five locations identified in the SOW (Figure 1).

3.1 ENVIRONMENTAL CONDITIONS

Weather data was collected from a weather station located at The Silo (Figure 1).

3.1.1 December 20, 2022

During the study period, the weather conditions included temperatures between 27 °F and 31 °F, winds out of the south between zero and six miles per hour, 70% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.1.2 December 21, 2022

During the study period, the weather conditions included temperatures between 23 °F and 32 °F, winds out of the southwest between zero and four miles per hour, 75% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.2 MONITORING EQUIPMENT

Sound level measurements were recorded using calibrated Casella CEL-633 ANSI or Quest SoundPro DL-2-1/3 sound level meters. Each monitor was set to log A-weighted, fast response, at one-second intervals. Each Casella monitor was programed to record audio to aid in identifying sound sources. Each unit was field calibrated before each monitoring event; each unit was also laboratory-qualified, technician calibrated (Appendix B). Each meter was tripod mounted at an approximate height of 5 feet, microphones were covered with windscreens. Monitors were outfitted with external batteries.

3.3 MONITORING LOCATION SOUND LEVELS

Sound levels were collected as discussed in Section 3.2 at each monitoring location between 10:00 a.m. – 4:00 p.m. (proposed testing hours). Sound level data was cleaned to remove anomalous sound sources, and data outside monitoring periods. Staffed sound level monitoring was conducted at each monitoring location to log the relative loudness, and the types of sounds that could be heard at each monitoring location. Photos of each monitoring location are provided in appendix B.

3.3.1 Monitoring Location M-1 –

Monitoring location M-1 is adjacent to Residential Receptor R-1 on Hale Hill Road at elevation 705 ft. amsl. 5,800 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-1 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-1 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic on Hale Hill Rd. to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 81.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 56.7 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 27.5 to 83.0 dBA.
- The average equivalent continuous sound level (L_{eq}) was 57.2 dBA

3.3.2 Monitoring Location M-2 -

Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surrounding Pulsifer Rd.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 24.8 to 70.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 42.5 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 25.0 to 70.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.8 dBA

3.3.3 Monitoring Location M-3

Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9,

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.2 to 82.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 59.6 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9,

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 86.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 61.2 dBA

3.3.4 Monitoring Location M-4

Monitoring Location M-4 is southwest of the Firing Pad next to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Occasional birds,
- Recreational use (snowmobiles),

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 18.1 to 70.7 dBA.
- The average equivalent continuous sound level (L_{eq}) was 39.1 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Occasional birds,
- Recreational use (snowmobiles),

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.5 to 71.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.9 dBA.

3.3.5 Monitoring Location M-5

Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.6 to 65.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 37.2 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.8 to 58.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 34.7 dBA.

4.0 SOUND PROROGATION MODEL

4.1.1 Sound Source (M109A3GN 155mm Field Howitzer)

A sound propagation model was developed for the area within a two-mile radius of the Firing Pad using the International Standards Organization ISO 9613 -1,2,3 standards applied in the dBmap.net noise mapping tool. The model accounts for surface reflection and absorption, atmospheric absorption, geometric divergence, weather conditions, topography, and source sound power level.

The sound power level of the Source was calculated based on the sound pressure levels shown in Table E.2 of Appendix E (Noise Emission Data for M109, 155mm Field Howitzer). The goal of the analyses was to develop data that could be used to model the attenuation of sound produced by a howitzer due to the previous lack of available information. The results of the Norwegian Defense Research Establishments (FFI) study demonstrated correlation with their recorded sound levels from the field (data used in H2H's analyses) and proved to be suitable for use in the FFI database.

The sound pressure levels shown in Table E.2 were measured at 803 ft. (245 meters) from the sound source by seven sensors positions at increasing angles from the direction of fire. Sensor 1 is positioned 32 degrees from the direction of fire and recorded a sound pressure level of 130.5 dB (loudest recorded sound level across the seven sensors) at 803 ft. (245 meters). The data shown in table E.2 was produced taking the energy mean of 15 shots. Using industry standard calculations, the sound power level at the Sound Source

(barrel of the M109, 155mm howitzer) was calculated to be 180.8 dB (163.2 dB(A)). The Sound Source sound level is without ground corrections. Uncorrected data has a higher sound presser level than corrected data providing a conservative sound level model (see Appendix E, Table E.1, free field, compared to Table E.2, without ground correction).
Figure 4 demonstrates the accuracy of the sound propagation model. Figure 4 shows the modeled sound pressure level (not A-weighted) at M-5 (same location as shown on Figure 3) and a receiver located 803 ft. (245 meters) west of the source labeled "Test Point." The sound source (barrel of the M109, 155mm howitzer (180.8 dB), and all model parameters are unchanged. The Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB showing correlation within ISO standards.

The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and Sound Source height of 6.5 feet is used. This field howitzer model is typical for its type and would represent the noisiest field howitzer tested on Site. The modeled scenario shows the M109A3GN firing from the Firing Pad (only location Sound Source will be operated) as shown on Figure 2. Appendix D summaries model input data.

The sound propagation model shows the modeled impulse sound level produced by the Sound Source; the duration of the impulse sound level is approximately 4 milliseconds. Model results are shown in Figure 3. Sound levels are A-weighted and shown in the form of isolines in 5 dB intervals from 45 dB(A) to 130 dB(A). Modeled sound levels at each monitoring location are labeled.

4.1.2 40-ton Haul Truck

A sound propagation model was developed for the same two-mile radius of the Firing Pad following the same standards. The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and sound source height of 6.5 feet is used. The sound power level used for the 40-ton Haul Truck (117.6 dB / 115.7 dB(A) is provided in the dBmap database. Appendix D summaries model input data.

The 40-ton Haul Truck being modeled is similar to or louder than the haul truck that will be used to transport the barrel assembly and measurement equipment to the Firing Pad. Figure 4 shows the access road the Haul Truck will be operating on to access the Firing Pad. The Haul Truck was modeled operating at three locations on the access road that would have the highest modeled sound level at identified receptors due to proximity and topography.

The sound propagation model shows the modeled sound level produced by the 40-ton Haul Truck (Figure 4). Sound levels are A-weighted and shown in the form of isolines in 5 dB intervals from 20 dB(A) to 85 dB(A). Modeled sound levels at each monitoring location are labeled.

4.2 EFFECT ON AMBIENT SOUND LEVELS

4.2.1 Sound Source (M109A3GN 155mm Field Howitzer)

To measure the effect the modeled impulse sound (shot fired from the howitzer) would have on ambient sound levels within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. The $L_{eq, 1\text{-}sec}$ recorded sound levels were exported to allow each $L_{eq, 1\text{-}sec}$ sound level over the monitoring period (10:00

a.m. to 4:00 p.m.) to be viewed individually. To measure how impulse sound levels would affect the ambient sound level at each monitoring location the modeled impulse sound level (Figure 3) at each monitoring location is input into the ambient data for that monitoring location. This was done twice to model the effect of two impulse sound levels (two shots per day). The results of each modeled scenario are compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

4.2.2 40-ton Haul Truck

To measure the effect the modeled sound (Haul Truck operating on site access road) would have on ambient sound level within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. Figure 4 and Table 1a / Table 1b show the modeled sound level at each monitoring location. The modeled sound level is well below the recorded ambient sound level at monitoring location M-1, M-2, M-3, and M-4 showing no potential impact. The modeled sound level at M-5 (66.7 dB(A)) is above the recorded ambient sound level of 34.7 dB(A). To measure how sound levels would affect the ambient sound level at M-5 the modeled sound level (Figure 4) at M-5 is input into the ambient data for that monitoring location. This was done ten times to model the effect of ten haul truck passes. No more than ten haul truck passes are anticipated per day. The modeled scenario at M-5 is compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

Table 1a: Tuesday, December 20, 2022, Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer			40-ton Haul Truck		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	57.2	75	57.2	0	44	-	-
M-2	42.5	71	42.8	0.3	20	-	-
M-3	59.6	73	59.6	0	33	-	-
M-4	39.1	79	41.9	2.8	33	-	-
M-5	37.2	107	66.7	29.5	60	37.9	0.7

Table 1b: Wednesday, December 21, 2022, Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer			40-ton Haul Truck		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	56.7	75	56.8	0.1	44	-	-
M-2	40.8	71	41.2	0.4	20	-	-
M-3	61.2	73	61.2	0	33	-	-
M-4	40.9	79	42.9	2	33	-	-

M-5	34.7	107	66.7	32	60	37.9	3.2

5.0 SUMMARY & CONCLUSIONS

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. Testing will only occur on weekdays, between the hours of 10:00 a.m. and 4:00 p.m. No more than two shots will be fired in one day. Forty-two residential receptors, and five parcels of NYS Land identified as Wild Forest fall within the Project Area (Figure 1). Sound level monitoring was conducted at five monitoring locations on December 20, 2022, and December 21, 2022, to determine ambient sound levels within the Project Area. Potential significant sources of sound associated with the project are the testing of the 155 mm howitzer and operation of 40-ton haul truck along the site access road to transport the 155 mm howitzer and monitoring equipment to the firing pad.

A sound propagation model was developed to evaluate the impulse sound level produced by the Sound Source (barrel of the M109, 155mm howitzer) within the Project Area (Figure 3). The effect of the modeled impulse sound level on ambient sound levels from each monitoring location is discussed in Section 4.2.1 and summarized in Table 1. An additional sound propagation model was developed to evaluate the sound levels produced by a 40-ton Haul Truck operating along the access road to the site. The effect of the modeled sound level on ambient sound levels from each monitoring location is discussed in Section 4.2.2 and summarized in Table 1.

The modeled sound level for the 40-ton Haul Truck operating along the access road to the site is well below the record ambient sound levels at M-1, M2, M3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 1). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-43) adjacent to the Firing Pad (Figure 2 & 4) shows a modeled sound level of 60 dB(A), and a modeled ambient sound level of 37.9 dB(A) a 3.2 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

The modeled change in ambient sound level from two shots of the Sound Source (barrel of the M109, 155 howitzer) is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 1). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-43) adjacent to the Firing Pad (Figure 2 & 3) shows a modeled impulse sound level of 107 dB(A), and a modeled ambient sound level of 66.7 dB(A) a 32.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

There are no identified public trails on or means of public access to R-43. In reviewing surrounding land uses three currently permitted hard rock mining operations exist within a 2.1-mile radius of the Site. Hard rock mining operations require regular blasting as part of their weekly operations, under the mines NYSDEC Mine Land Reclamation Permit an air blast limit of 133 dB measured to the closest structure outside the permit area is permitted. 133 dB is 26 dB above the modeled sound level of 107 dB(A) at R-43. In addition, one of the currently permitted mining operations is adjacent to lands classified as Wilderness. Lands classified as Wilderness are considered to be less impacted by human use than lands classified as State Forest.

Based on the information presented in this report the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area.

FIGURES

FIGURE 1 –SITE OVERVIEW MAP

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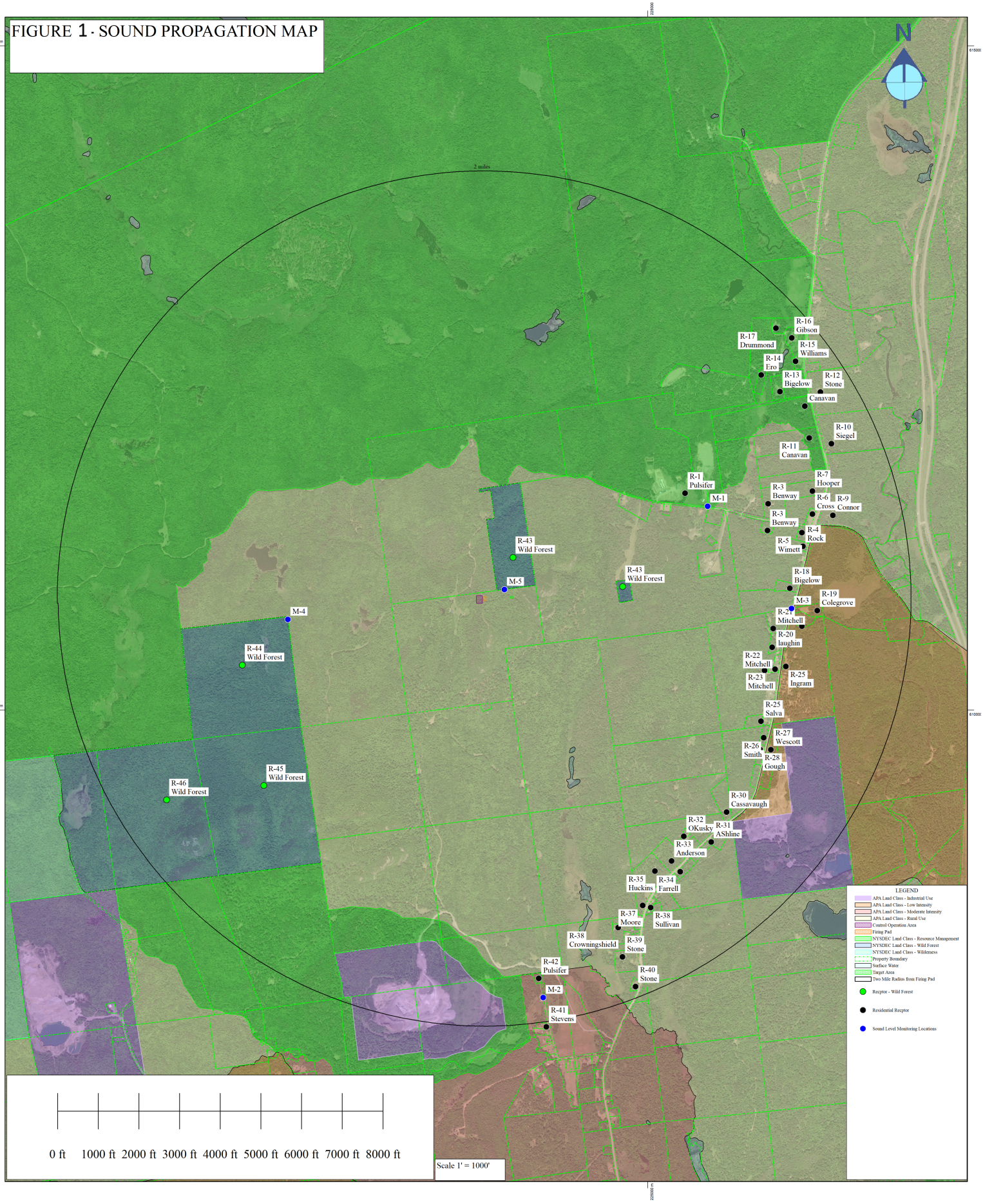
FIGURE 1 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
M-1
R-7 Hooper
R-3 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
R-43 Wild Forest
M-5
R-18 Bigelow
M-3
R-19 Colegrove
R-21 Mitchell
R-20 laughin
R-22 Mitchell
R-23 Mitchell
R-25 Ingram
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
M-4
R-44 Wild Forest
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-40 Stone
R-42 Pulsifer
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Recptor - Wild Forest
Residential Recptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1' = 1000'

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FIGURE 2 – SITE MAP

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FIGURE - 2 SITE MAP



343

FIGURE 3 – SOUND PROPAGATION MAP

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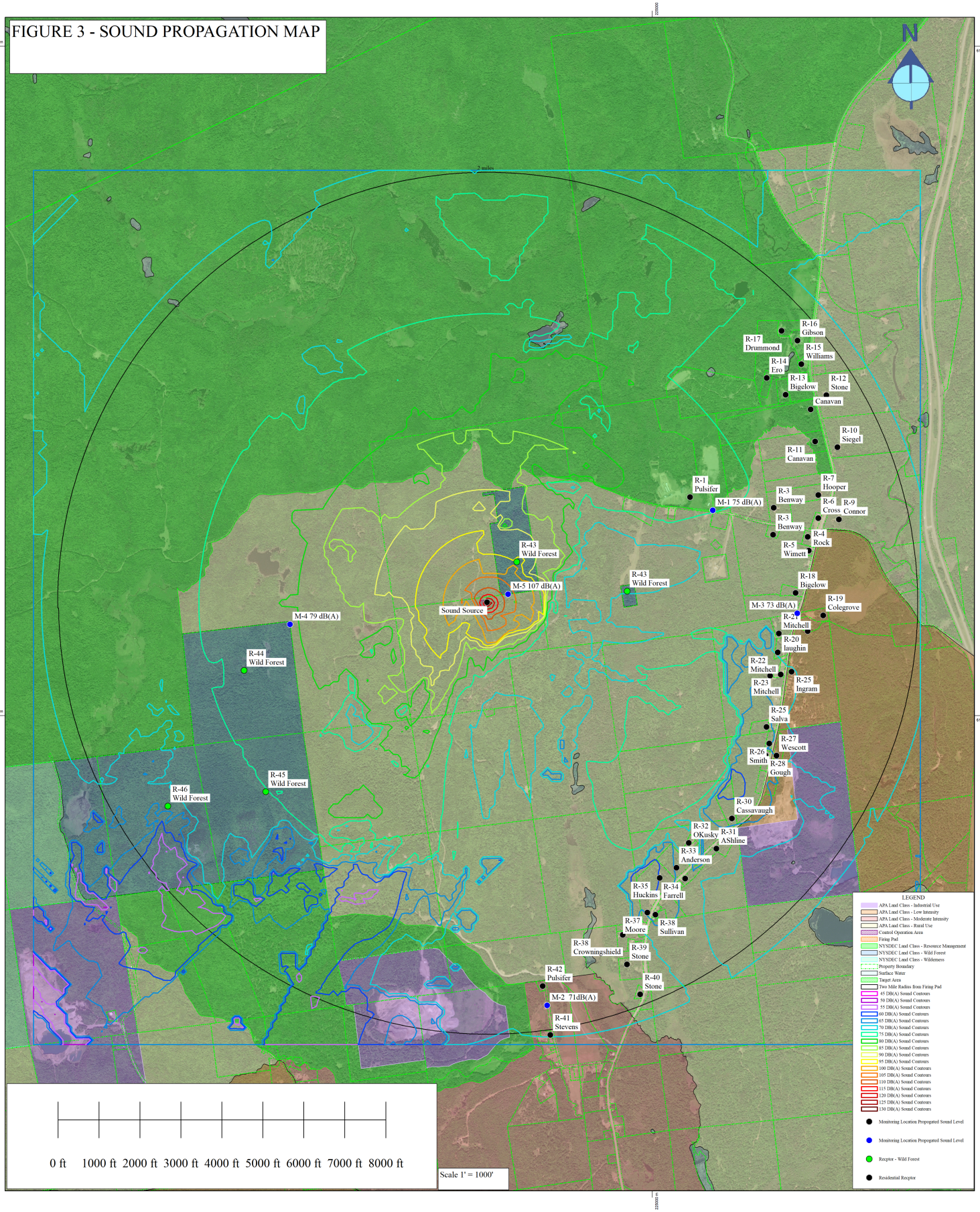
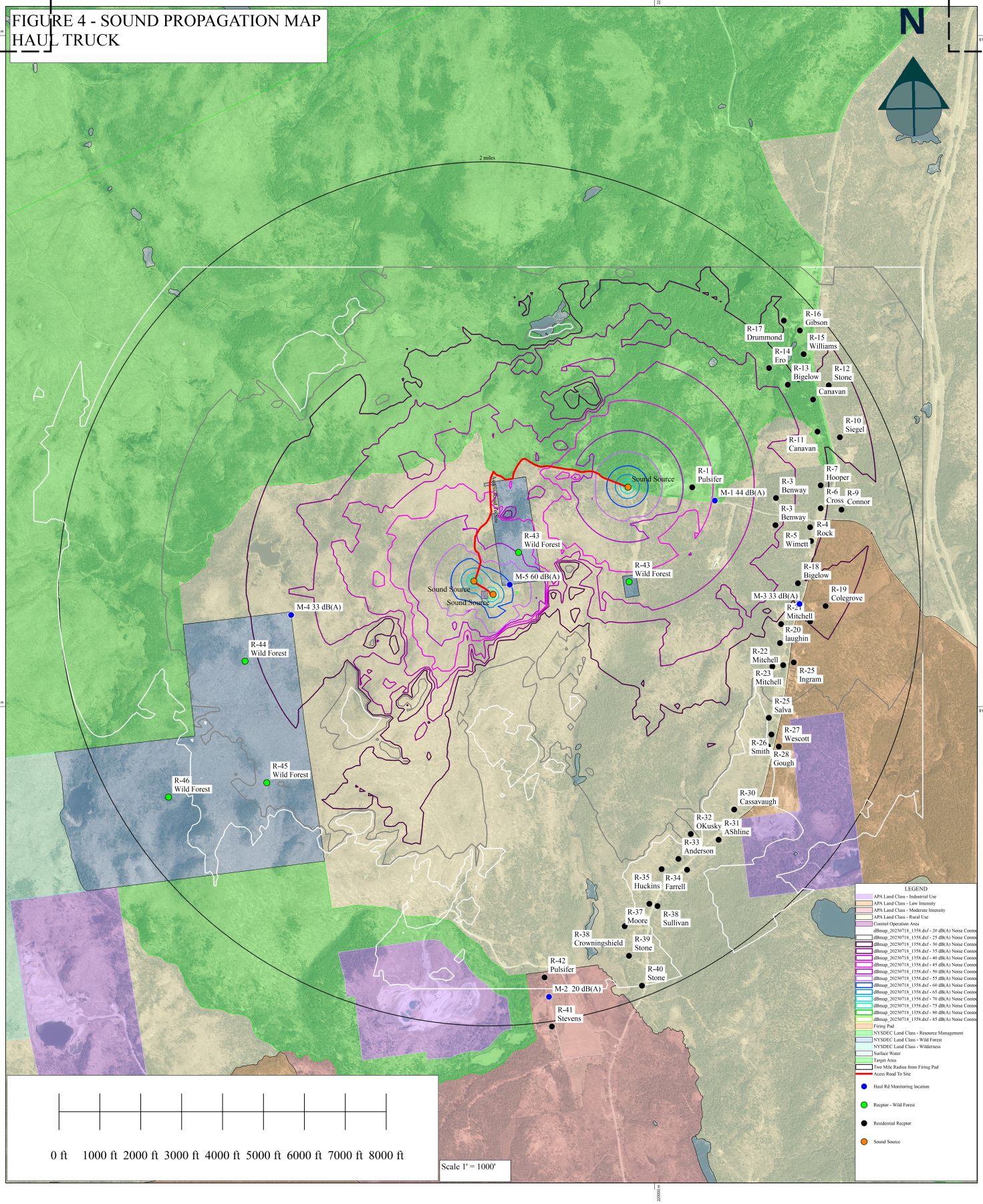
FIGURE 3 - SOUND PROPAGATION MAP



345

FIGURE 4 - SOUND PROPAGATION MAP
HAUL TRUCK



APPENDICES

APPENDIX A –
NYSDEC – ASSESSING AND MITIGATING NOISE IMPACTS

Assessing and Mitigating Noise Impacts

New York State
Department of Environmental Conservation

PROGRAM POLICY	**Department ID: DEP-00-1**	**Program ID: n/a**
Issuing Authority: Environmental Conservation Law Articles 3, 8, 23, 27 Name: Jeffrey Sama Title: Director Signature: /S/ Date: 10/6/00 Issuance Date: October 6, 2000 Revised: February 2, 2001	**Originating Unit: Division of Environmental Permits** Office/Division: Environmental Permits Unit: Phone: (518) 402-9167 Latest Review Date (Office Use):	

Abstract: Facility operations regulated by the Department of Environmental Conservation located in close proximity to other land uses can produce sound that creates significant noise impacts for proximal sound receptors. This policy and guidance presents noise impact assessment methods, examines the circumstances under which sound creates significant noise impacts, and identifies avoidance and mitigative measures to reduce or eliminate noise impacts.

Related References: See references pages 27 and 28.

I. PURPOSE[1]

This policy is intended to provide direction to the staff of the Department of Environmental Conservation for the evaluation of sound levels and characteristics (such as pitch and duration) generated from proposed or existing facilities. This guidance also serves to identify when noise levels may cause a significant environmental impact and gives methods for noise impact assessment, avoidance, and reduction measures. These methods can serve as a reference to applicants preparing environmental assessments in support of an application for a permit. Additionally, this guidance explains the Department's regulatory authority for undertaking noise evaluations and for imposing conditions for noise mitigation measures in the agency's approval

[1] A Program Policy Memorandum is designed to provide guidance and clarify program issues for Division staff to ensure compliance with statutory and regulatory requirements. It provides assistance to New York State Department of Environmental Conservation (DEC) staff and the regulated community in interpreting and applying regulations and statutes to assure that program uniformity is attained throughout the State. Nothing set forth in a Program Policy Memorandum prevents DEC staff from varying from that guidance as specific circumstances may dictate, provided the staff's actions comply with applicable statutory and regulatory requirements. As this guidance document is not a fixed rule, it does not create any enforceable right by any party using the Program Policy Memorandum.

of permits for various types of facilities pursuant to regulatory program regulations and the State Environmental Quality Review Act (SEQR).

II. BACKGROUND

Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by proposed or existing facilities may become noise due to land use surrounding the facility. When lands adjoining an existing or proposed facility contain residential, commercial, institutional or recreational uses that are proximal to the facility, noise is likely to be a matter of concern to residents or users of adjacent lands.

A. Sources of Noise Generation

The three major categories of noise sources associated with facilities are (1) fixed equipment or process operations; (2) mobile equipment or process operations; and (3) transport movements of products, raw material or waste. The fixed plant may include a very wide range of equipment including: generators; pumps; compressors; crushers of plastics, stone or metal; grinders; screens; conveyers; storage bins; or electrical equipment. Mobile operations may include: drilling; haulage; pug mills; mobile treatment units; and service operations. Transport movements may include truck traffic within the operation, loading and unloading trucks and movement in and out of the facility. Any or all of these activities may be in operation at any one time. Singular or multiple effects of sound generation from these operations may constitute a potential source of noise.

B. Potential for Adverse Impacts

Numerous environmental factors determine the level or perceptibility of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; time of day; wind direction; temperature gradient; and relative humidity. The characteristics of a sound are also

important determining factors for considering it as noise. The amplitude (loudness), frequency (pitch), impulse patterns and duration of sound all affect the potential for a sound to be a noise. The combination of sound characteristics, environmental factors and the physical and mental sensitivity of a receptor to a sound determine whether or not a sound will be perceived as a noise. This guidance uses these factors in assessing the presence of noise and the significance of its impacts. It relies upon qualitative and quantitative sound evaluation techniques and sound pressure level impact modeling presented in accepted references on the subject.

C. Mitigation

Mitigation refers to actions that will be taken to reduce the effects of noise or the noise levels on a receptor. Adverse noise effects generated by a facility can be avoided or reduced at the point of generation thereby diminishing the effects of the noise at the point of reception. This guidance identifies various mitigation techniques and their proper application either at the source of noise generation or on a facility's property. Alternative construction or operational methods, equipment maintenance, selection of alternative equipment, physical barriers, siting of activities, set backs, and established hours of construction or operation, are among the techniques that can successfully avoid or reduce adverse noise effects.

D. Decision Making

When an assessment of the potential for adverse noise impacts indicates the need for noise mitigation, it is preferred that specifications for such measures be incorporated in a noise analysis and in the applicant's work or operational plan necessary for a complete application. Presenting a plan that incorporates effective noise mitigation provisions facilitates the Department's technical and environmental review and minimizes or negates the imposition of permit conditions by the Department. Adherence to these plans becomes a condition of a permit.

Noise avoidance and mitigation measures may also be imposed directly as conditions of permit issuance. This guidance will review the statutory authority under which the Department can require the mitigation of noise effects.

III. POLICY

In the review of an application for a permit, the Department of Environmental Conservation is to evaluate the potential for adverse impacts of sound generated and emanating to receptors outside of the facility or property. When a sound level evaluation indicates that receptors may experience sound levels or characteristics that produce significant noise impacts or impairment of property use, the Department is to require the permittee or applicant to employ reasonable and necessary measures to either eliminate or mitigate adverse noise effects. Options to be used to fulfill this guidance should be implemented within the existing regulatory and environmental review framework of the agency.

Regulatory authority for assessing and controlling noise effects are contained in both SEQR and specific Department program regulations. Specific regulatory references are as follows:

Section 3-0301(1)(i) of the Environmental Conservation Law (ECL) states that the commissioner shall have the power to: "i. Provide for prevention and abatement of all water, land and air pollution including but not limited to that related to particulates, gases, dust, vapors, noise, radiation, odor, nutrients and heated liquids."

To comply with Article 8 of the ECL and 6 NYCRR Part 617, State Environmental Quality Review Act, consideration of all relevant environmental issues must be undertaken in making a determination of environmental significance. Noise impact potential is one of many potential issues for consideration in a SEQR review.

Environmental Conservation Law (ECL) Article 23, Title 27, Mined Land Reclamation Law (MLRL), requires applicants for permits to prepare and submit a mined land use plan to the Department for approval. The plan must describe, "the applicant's mining method and measures

to be taken to minimize adverse environmental impacts resulting from the mining operation." The provisions to be incorporated in a Mined Land Use Plan, as specified in 6 NYCRR Section 422.2, include the control of noise as a component of the plan.

The solid waste regulations at 6 NYCRR Subdivision 360-1.14(p), establish A-weighted decibel levels that are not to be exceeded at the property line of a facility.

The Division of Air Resources has regulations in 6 NYCRR Parts 450 through 454 that regulate the allowable sound level limits on certain motor vehicles. The statutory authority for these regulations is found in the New York State Vehicle and Traffic Law, Article 10, Section 386.

This guidance does not supercede any local noise ordinances or regulations.

IV. RESPONSIBILITY

The environmental analyst, acting as project manager for the review of applications for permits or permit modifications and working in concert with the program specialist, is responsible for ensuring that sound generation and noise emanating from proposed or existing facilities are properly evaluated. For new permits or significantly modified permits, there should be a determination as to the potential for noise impacts, and establishment of the requirements for noise impact assessment to be included in the application for permit. Where the Department is lead agency, the analyst is responsible for making a determination of significance pursuant to SEQR with respect to potential noise impacts and include documentation for such determination.

Where impacts are to be avoided or reduced through mitigation measures, the analyst, or where there are program requirements to address noise, the program specialist, should determine the effectiveness and feasibility of those measures and ensure that the permit conditions contain specific details for such measures. It should also be determined if additional measures to control noise are to be imposed as a condition of permitting. Appropriate permit language for the permit conditions should be developed by the program specialist and the analyst. The results of noise impact evaluations and the effectiveness of mitigation measures

shall be incorporated into SEQR documents and, where necessary, permit conditions shall be placed in final permits to ensure effective noise control.

When it is determined that potential noise effects, as well as other issues, warrant evaluation of impacts and mitigation measures in a Draft Environmental Impact Statement (EIS) prepared pursuant to SEQR, the environmental analyst with the Division of Environmental Permits assumes responsibility for determining the level of evaluation needed to assess sound level generation, noise effects, and mitigation needs and feasibility.

For existing facilities, the program specialist will determine the need for additional mitigation measures to control noise effects either in response to complaints or other changes in circumstances such as new noise from existing facilities or a change in land-use proximal to the facility.

The applicant or their agent, in preparing an application for a permit and supporting documentation, is responsible for assessing the potential noise impacts on area receptors. When potential adverse noise impacts are identified, the applicant should incorporate noise avoidance and reduction measures in the construction or operating plans. The applicant's submittal should also assess the effectiveness of proposed mitigation measures in eliminating adverse noise reception. Where noise effects are determined to be a reason in support of a SEQR positive declaration, the applicant shall assess noise impacts, avoidance, and mitigation measures in a Draft EIS using methodologies acceptable to this Department.

V. PROCEDURE

The intent of this section is to: introduce terms related to noise analyses; describe some of the various methods used to determine the impacts of sound pressure levels on receptors; identify some of the various attenuators of noise; and list some of the mitigative techniques that can be used to reduce the effects of noise on a receptor. At the end of the section three levels of analysis are described. The first level determines the potential for adverse noise impacts based on noise characteristics and sound pressure increases solely on noise attenuation over distance between the source and receptor of the noise. The second level factors other considerations such as topography and noise abatement measures in determining if adverse

noise impacts will occur. The third level evaluates noise abatement alternatives and their effectiveness in avoiding or reducing noise impacts.

The environmental effects of sound and human perceptions of sound can be described in terms of four characteristics:

1. Sound Pressure Level (SPL may also be designated by the symbol L_p) or perceived loudness is expressed in decibels (dB) or A-weighted decibel scale dB(A) which is weighted towards those portions of the frequency spectrum, between 20 and 20,000 Hertz, to which the human ear is most sensitive. Both measure sound pressure in the atmosphere.

2. Frequency (perceived as pitch), the rate at which a sound source vibrates or makes the air vibrate.

3. Duration i.e., recurring fluctuation in sound pressure or tone at an interval; sharp or startling noise at recurring interval; the temporal nature (continuous vs. intermittent) of sound.

4. Pure tone which is comprised of a single frequency. Pure tones are relatively rare in nature but, if they do occur, they can be extremely annoying.

Another term, related to the average of the sound energy over time, is the Equivalent Sound Level or $L_{eq.}$ The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent Sound Level is considered to be directly related to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time. By its derivation L_{eq} does not express the maximum nor minimum SPLs that may occur in a given time period. These maximum and minimum SPLs should be given in the noise analysis. The time interval over which the L_{eq} is measured should always be given. It is generally shown as a parenthetic; $L_{eq\,(8)}$ would indicate that the sound had been measured for a period of eight hours.

Equivalent Sound Level (L_{eq}) correlates well and can be combined with other types of noise analyses such as Composite Noise Rating, Community Noise Equivalent Level and day-night noise levels characterized by L_{dn} where an $L_{eq(24)}$ is measured and 10 dBA is added to all noise levels measured between 10 pm and 7 am. These different types of noise analyses

basically combine noise measurements into measures of cumulative noise exposure and may weight noise occurring at different times by adding decibels to the actual decibel level. Some of these analyses require more complex noise analysis than is mentioned in this guidance. They may be used in a noise analyses prepared for projects.

Designations for sound levels may also be shown as $L_{(10)}$ or $L_{(90)}$ in a noise analysis. These designations refer to the sound pressure level (SPL) that is exceeded for 10% of the time over which the sound is measured, in the case of $L_{(10)}$, and 90% of the time, in the case of $L_{(90)}$. For example, an $L_{(90)}$ of 70 dB(A) means that 70 dB(A) is exceeded for 90% the time for which the measurement was taken.

A. Environmental Setting and Effects on Noise Levels

1. Sound Level Reduction Over Distance - It is important to have an understanding of the way noise decreases with distance. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, SPL changes in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dB reduction in the sound. Therefore, a sound level of 70 dB at 50 feet would have a sound level of approximately 64 dB at 100 feet. At 200 feet sound from the same source would be perceived at a level of approximately 58 dB.

2. Additive Effects of Multiple Sound Sources - The total sound pressure created by multiple sound sources does not create a mathematical additive effect. Below Table A is given to assist you in calculating combined noise sources. For instance, two proximal noise sources that are 70 dBA each do not have a combined noise level of 140 dBA. In this case the combined noise level is 73 dBA. Since the difference between the two sound levels is 0 dB, Table A tells us to add 3 dB to the sound level to compensate for the additive effects of the sound. To find the cumulative SPL assess the SPLs starting with the two lowest readings and work up to the difference between the two highest readings. For several pieces of equipment, operating at one

time, calculate the difference first between the two lowest SPLs, check Table A and add the appropriate number of decibels to the higher of the two sound levels. Next, take the sound level that was calculated using Table A and subtract the next lowest sound level to be considered for the operation. Consult Table A again for the additive effect and add this to the higher of the two sound levels. Follow this process until all the sound levels are accounted for. As an example, let us say that an area for a new facility is being cleared. The equipment to be used is: two chainsaws, one operating at 57 dBA and one at 60 dBA; a front end loader at 80 dBA; and a truck at 78 dBA. Start with the two lowest sound levels: 60 dBA - 57 dBA = 3 dBA difference. Consulting the chart add 2 dBA to the higher sound level. The cumulative SPL of the two chainsaws is 62 dBA. Next, subtract 62 dBA from 78 dBA. 78 dBA - 62 dBA = 16 dBA. In this case, 0 dBA is added to the higher level so we end up with 78 dBA. Lastly, subtract 78 dBA from the 80 dBA. 80 dBA - 78 dBA = 2 dBA a difference of 2 dBA adds 2 dBA to the higher SPL or 82 dBA. The SPL from these four pieces of equipment operating simultaneously is 82 dBA.

Table A

Approximate Addition of Sound Levels

Difference Between Two Sound Levels	Add to the Higher of the Two Sound Levels
1 dB or less	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0 dB

(USEPA, Protective Noise Levels, 1978)

3. Temperature and Humidity - Sound energy is absorbed in the air as a function of temperature, humidity and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. Such attenuation is short term and, since it occurs over a great distance, should not be considered in calculations. Higher temperatures tend to increase sound velocity but does

not have an effect on the SPL. Sound waves bend towards cooler temperatures. Temperature inversions may cause temporary problems when cooler air is next to the earth allowing for more distant propagation of sound. Similarly, sound waves will bend towards water when it is cooler than the air and bounce along the highly reflective surface. Consequently large water bodies between the sound source and the receptor may affect noise attenuation over distance.

4. Time of Year - Summer time noises have the greatest potential for causing annoyance because of open windows, outside activities, etc. During the winter people tend to spend more time indoors and have the windows closed. In general, building walls and windows that are closed provide a 15 dB reduction in noise levels. Building walls with the windows open allow for only a 5 dB reduction in SPL.

5. Wind - Wind can further reduce the sound heard at a distance if the receptor is upwind of the sound. The action of the wind disperses the sound waves reducing the SPLs upwind. While it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experienced at the same distance without a wind. This dispels the common belief that sound levels are increased downwind due to wind carrying noise.

6. Land forms and structures - In certain circumstances, sound levels can be accentuated or focused by certain features to cause adverse noise impacts at specified locations. At a hard rock mine, curved quarry walls may have the potential to cause an amphitheater effect while straight cliffs and quarry walls may cause an echo. Buildings that line streets in cities can cause a canyon effect where sound can be reflected from the building surfaces similar to what might happen in a canyon. Consideration of noise impacts associated with these types of conditions may require specialized expertise to evaluate impact potential and to formulate suitable mitigation techniques.

Consideration of existing noise sources and sound receptors in proximity to a proposed activity can be important considerations even when the activity under review is not a noise source. Topography, vegetation, structures and the relative location of noise receptors and sources to these features are all aspects of the environmental setting that can influence noise impact potential. As such, land alteration may also indirectly create an adverse noise impact where natural land features or manmade features serve as a noise barrier or provide noise attenuation for existing sources of noise, i.e. highway, railroads, manufacturing activity. Removal of these features, i.e. hills, vegetation, large structures or walls, can expose receptors to increased sound pressure levels causing noise problems where none had previously existed.

B. Impact Assessment

1. Factors to Consider

Factors to consider in determining the impact of noise on humans, are as follows:

a. Evaluation of Sound Characteristics

(1) Ambient noise level - A noise can only intrude if it differs in character or SPL from the normal ambient sound. Most objective attempts to assess nuisance noise adopt the technique of comparing the noise with actual ambient sound levels or with some derived criterion.

(2) Future noise level - The ambient noise level plus the noise level from the new or proposed source.

(3) Increase In Sound Pressure Level - A significant factor in determining the annoyance of a noise is Sound Pressure Level (SPL). SPLs are measured in decibels.

(4) Sharp and Startling Noise - These high frequency and high intensity noises can be extremely annoying. When initially evaluating the effects

of noise from an operation, pay particular attention to noises that can be particularly annoying. One such noise is the back-up beepers required to be used on machinery. They definitely catch one's attention as they were meant to do. Continual beeping by machinery can be mitigated (see Section V.C. Mitigation - Best Management Practices). Another impulse noise source that can be very annoying is the exhaust from compressed air machinery. This exhaust is usually released in loud bursts. Compressed air exhaust can also be mitigated if it causes a noise problem by using readily available mufflers or specifically designed enclosures.

(5) Frequency and Tone - Frequency is the rate at which a sound source vibrates or makes the air vibrate. Frequency is measured in Hertz (Hz). Frequency can also be classified as high ("sharp"), low ("dull"), and moderate. Pure tones are rare in nature. Tonal sounds usually consist of pure tones at several frequencies. Pure tones and tonal sounds are discerned more readily by the human ear. Pure tones and tonal sounds are compensated for in sound studies by adding a calculated number of dB(A) to the measured sound pressure.

(6) Percentile of Sound Levels - Fluctuations of SPLs can be expressed as a percentile level designated as $L_{(n)}$ where a given decibel level is exceeded *n* % of the time. A designation of $L_{(10)}$ = 70 dBA means the measured SPLs exceeded 70 dBA 10% of the time. A designation of $L_{(90)}$ = 70 dBA means the measured SPLs were exceeded 90% of the time. $L_{(90)}$ is often used to designate the background noise level.

(7) Expression of Overall Sound - Part of the overall assessment of sound is the *Equivalent Sound Level* (L_{eq}) which assigns a single value of sound level for a period of time in which varying levels of sound are experienced over that time period. The L_{eq} value provides an indication of the effects of sound on people. It is also useful in establishing the ambient sound levels at a potential noise source.

In order to evaluate the above factors in the appropriate context, one must identify the following: 1) appropriate receptor locations for sound level calculation or measurement; 2) ambient sound levels and characteristics at these receptor locations; and 3) the sound pressure increase and characteristics of the sound that represents a significant noise effect at a receptor location.

b. Receptor Locations

Appropriate receptor locations may be either at the property line of the parcel on which the facility is located or at the location of use or inhabitance on adjacent property. The solid waste regulations require the measurements of sound levels be at the property line. The most conservative approach utilizes the property line. The property line should be the point of reference when adjacent land use is proximal to the property line. Reference points at other locations on adjacent properties can be chosen after determining that existing property usage between the property line and the reference point would not be impaired by noise, i.e., property uses are relatively remote from the property line. The location of the facility should be shown on a map in relation to each potential receptor. Any future expansion should be described in a narrative as well as depicted on a map. The map and narrative should also include the distance of the operation to each point of reception including the distance at the point in time when an expanding operation will be closest to the receptors.

c. Thresholds for Significant Sound Pressure Level (SPL) Increase

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on

existing SPLs and the character of surrounding land use and receptors. SPL increases approaching 10 dB result in a perceived doubling of SPL. The perceived doubling of the SPL results from the fact that SPLs are measured on a logarithmic scale. An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases. The above thresholds as indicators of impact potential should be viewed as guidelines subject to adjustment as appropriate for the specific circumstances one encounters.

Establishing a maximum SPL at the point of reception can be an appropriate approach to addressing potential adverse noise impacts. Noise thresholds are established for solid waste management facilities in the Department's Solid Waste regulations, 6 NYCRR Part 360. Most humans find a sound level of 60 - 70 dB(A) as beginning to create a condition of significant noise effect (EPA 550/9-79-100, November 1978). In general, the EPA's "Protective Noise Levels" guidance found that ambient noise levels # 55 dBA $L_{(dn)}$ was sufficient to protect public health and welfare and, in most cases, did not create an annoyance (EPA 550/9-79-100, November 1978). In non-industrial settings the SPL should probably not exceed ambient noise by more than 6 dB(A) at the receptor. An increase of 6 dB(A) may cause complaints. There may be occasions where an increase in SPLs of greater than 6 dB(A) might be acceptable. The addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dB(A). This would be considered the "upper end" limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet. Some outdoor activities can be conducted at a SPL of 65 dB(A). Still lower ambient noise levels may be necessary if there are sensitive receptors nearby. These goals can be attained by using the mitigative techniques outlined in this guidance.

Ambient noise SPLs in industrial or commercial areas may exceed 65 dB(A) with a high end of approximately 79 dB(A) (EPA 550/9-79-100, November 1979). In these instances mitigative measures utilizing best management practices should be used in an effort to ensure that a facility's generated sound levels are at a minimum. The goal in an industrial/commercial area, where ambient SPLs are already at a high level, should be not to exceed the ambient SPL. Remember, if a new source

operates at the same noise level as the ambient, then 3 dB(A) must be added to the existing ambient noise level to obtain the future noise level. If the goal is not to raise the future noise levels the new facility would have to operate at 10 dB(A) or more lower than the ambient.(see Table A)

Table B

HUMAN REACTION TO INCREASES IN SOUND PRESSURE LEVEL

Increase in Sound Pressure (dB)	Human Reaction
Under 5	Unnoticed to tolerable
5 - 10	Intrusive
10 - 15	Very noticeable
15 - 20	Objectionable
Over 20	Very objectionable to intolerable

(Down and Stocks - 1978)

Impact assessment will vary for specific project reviews, but must consist of certain basic components for all assessments. Additional examination of sound generation and noise reception are necessary, where circumstances warrant. Sound impact evaluation is an incremental process, with four potential outcomes:

- exemption criteria are met and no noise evaluation is required;
- noise impacts are determined to be non-significant (after first-level evaluation);
- noise impacts are identified as a potential issue but can be readily mitigated (after second level evaluation); or
- noise impacts are identified as a significant issue requiring analysis of alternatives as well as mitigation (third level evaluation).

All levels of evaluation may require preparation of a noise analysis. The required scope of noise impact analysis can be rudimentary to rather sophisticated, depending on circumstances and the results obtained from initial levels of evaluation. Recommendations for each level of evaluation are presented below.

2. Situations in Which No Noise Evaluation is Necessary

When certain criteria are satisfied, the need for undertaking a noise impact analysis at any level is eliminated. These criteria are as follows:

a. The site is contained within an area in which local zoning provides for the intended use as a "right of use". It does not apply to activities that are permissible only after an applicant is granted a special use permit by the local government; and

b. The applicant's operational plan incorporates appropriate best management practices (BMPs [see Section V.C. Mitigation - Best Management Practices]) for noise control for all facets of the operation.

Where activities may be undertaken as a "right of use", it is presumed that noise has been addressed in establishing the zoning. Any residual noise that is present following BMP implementation should be considered an inherent component of the activity that has been found acceptable in consideration of the zoning designation of the site.

3. First Level Noise Impact Evaluation

The initial evaluation for most facilities should determine the maximum amount of sound created at a single point in time by multiple activities for the proposed project. All facets of the construction and operation that produce noise should be included such as land clearing activities (chain saw and equipment operation), drilling, equipment operation for excavating, hauling or conveying materials, pile driving, steel work, material processing, product storage and removal. Land clearing and construction may be only temporary noise at the site whereas the ongoing operation of a facility would be considered permanent noise. An analysis may be required for

various phases of the construction and operation of the project to assure that adverse noise effects do not occur at any phase.

To calculate the sound generated by equipment operation, one can consult the manufacturers' specifications for sound generation, available for various types of equipment. Another option for calculating the sound to be generated by equipment is to make actual measurements of sound generated by existing similar equipment, elsewhere.

Tables C and D summarize noise measurements from some common equipment used in construction and mining. Table E summarizes the noise level, in decibels (dB[A]), from some common sources. This information can be used to assist Department staff in relating potential noise impacts to sound levels produced by commercial and industrial activities. Use of these tables in the first level of analysis will help determine whether or not noise will be an issue and whether actual measurements should be made to confirm noise levels.

Table C

PROJECTED NOISE LEVELS

Noise Source	Measurements	1,000 feet	2,000 feet	3,000 feet
Primary and secondary crusher	89 dB(A) at 100 ft	69.0 dB(A)	63.0 dB(A)	59.5 dB(A)
Hitachi 501 shovel loading	92 dB(A) at 50 ft	66.0 dB(A)	60.0 dB(A)	56.5 dB(A)
Euclid R-50 pit truck loaded	90 dB(A) at 50 ft	64.0 dB(A)	58.0 dB(A)	54.4 dB(A)
Caterpillar 988 loader	80 dB(A) at 300 ft	69.5 dB(A)	63.5 dB(A)	60.0 dB(A)

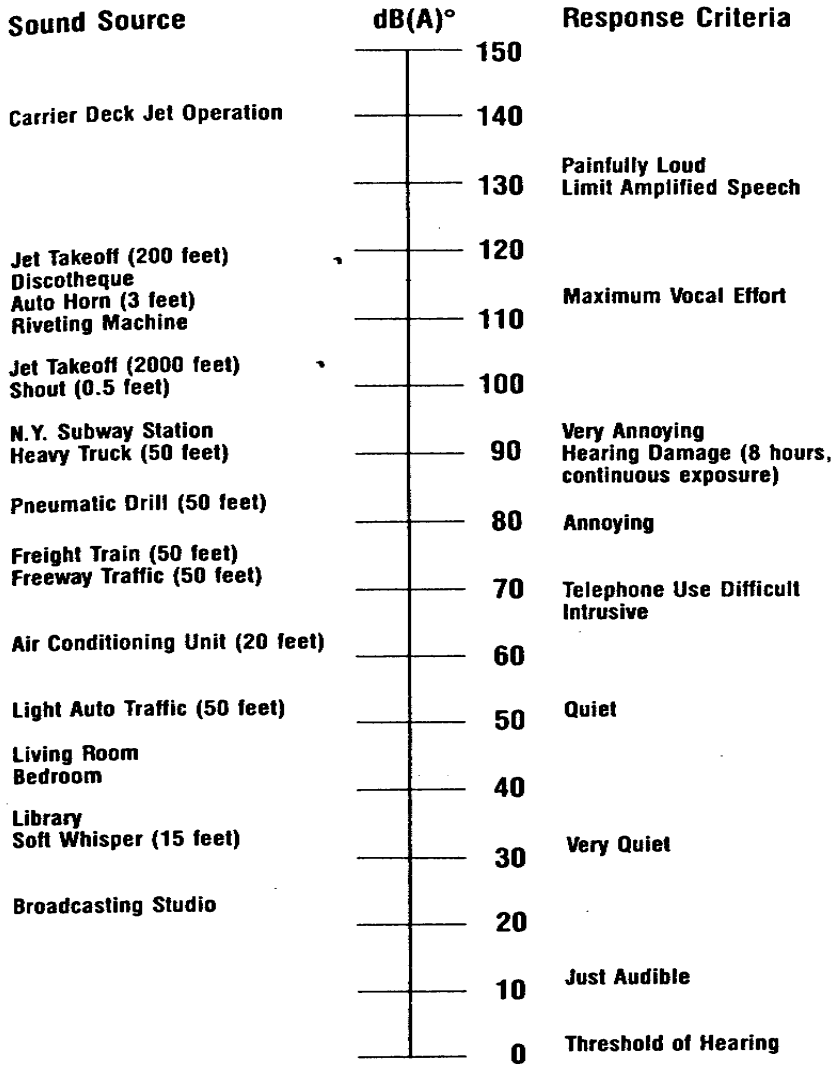
(The Aggregate Handbook, 1991)

Table D
Common Equipment Sound Levels

EQUIPMENT	**DECIBEL LEVEL**	**DISTANCE** in feet
Augered earth drill	80	50
Backhoe	83-86	50
Cement mixer	63-71	50
Chain saw cutting trees	75-81	50
Compressor	67	50
Garbage Truck	71-83	50
Jackhammer	82	50
Paving breaker	82	50
Wood Chipper	89	50
Bulldozer	80	50
Grader	85	50
Truck	91	50
Generator	78	50
Rock drill	98	50

(excerpt and derived from Cowan, 1994)

Table E



(The Aggregate Handbook, 1991)

The sound level at receptor locations should be calculated using the inverse square rule whereby sound is attenuated over distance. Again, each doubling of the distance from the source of a noise decreases the SPL by 6 dB(A) at distances greater than 50 feet. This calculation should first consider the straight line distance between the point of noise generation and the point of noise reception with the presumption that no natural or manmade features exist along the transect between the two points that would further attenuate sound level. Calculations should be performed for each point of reception in all directions being careful to evaluate the worst case noise impact potential by considering activities at the point where they would be closest to a receptor. The sound level calculated for the point of reception should be related to ambient sound levels. Ambient sound levels can be either measured or assumed based on established references for the environmental setting and land use at the point of reception. For estimation purposes, ambient SPLs will vary from approximately 35 dB(A) in a wilderness area to approximately 87 dB(A) in a highly industrial setting. A quiet seemingly serene setting such as rural farm land will be at the lower end of the scale at about 45 dB(A), whereas an urban industrial area will be at the high end of this scale at around 79 dB(A) (EPA 550/9-79-100, November 1978). If there is any concern that levels based on reference values do not accurately reflect ambient SPL, field measurements should be undertaken to determine ambient SPLs.

Where this evaluation indicates that sound levels at the point of reception will not be perceptible, similar to or only slightly elevated as compared to ambient conditions, no further evaluation is required. When there is an indication from this initial analysis that marginal or significant noise impact may occur, further evaluation is required. In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive. (see B.1.a Evaluation of Sound Characteristics)

4. Second Level Noise Impact Evaluation

Further refine the evaluation of noise impact potential by factoring in any additional noise attenuation that will be provided by existing natural topography, fabricated structures such as buildings, walls or berms or vegetation located between the point of noise generation and noise reception. This analysis may require consideration of future conditions and the loss of natural noise buffers over time.

Dense vegetation that is at least 100 feet in depth will reduce the sound levels by 3 to 7 dB(A). Evergreens provide a better vegetative screen than deciduous trees. Keep in mind that if a vegetative screen does not currently exist, planting a vegetative screen may require 15 or more years of growth before it becomes effective.

The degree to which topography attenuates noise depends on how close the feature is located to the source or the receptor of the noise. Topography can act as a natural screen. The closer a hill or other barrier is to the noise source or the receptor, the larger the sound shadow will be on the side opposite the noise source. Certain operations such as mining and landfills may be able to use topography to maintain a screen between the operation and receptors as they progress. Mining operations may be able to create screens by opening a mine in the center of the site using and maintaining the pit walls as barriers against sound (Aggregate Handbook, 1991).

If after taking into account all the attenuating features the potential still exists for adverse noise impact, other types of noise analyses or modeling should be used to characterize the source. An Equivalent Sound Level (L_{eq}) analysis or a related type of noise analysis may better define activities or sources that require more mitigation or isolation so that noise emanating from these sources will not cause an adverse impact.

Where it is demonstrated that noise absorbing or deflecting features further attenuate sound reception to a level of no significant increase, no further analysis is necessary. Where it is determined that noise level or the character of the noise may

have a significant adverse effect on receptors, other noise mitigation measures should be evaluated in an expanded noise analysis.

5. Third Level - Mitigation Measures

When the above analyses indicate significant noise effects may or will occur, the applicant should evaluate options for implementation of mitigation measures that avoid, or diminish significant noise effects to acceptable levels (see Section V.C. Mitigation - Best Management Practices). Adequate details concerning mitigation measures and an evaluation of the effectiveness of the mitigative measures through additional sound level calculations should be provided in a noise analysis. These calculations are to factor in the noise reduction or avoidance capabilities of the mitigation measures. In circumstances where noise effects cannot readily be reduced to a level of no significance by project design or operational features in the application, the applicant must evaluate alternatives and mitigation measures in an environmental impact statement to avoid or reduce impacts to the maximum extent practicable per the requirements of the State Environmental Quality Review Act (SEQR).

The noise analysis should be part of the application or a supplement to it, and will be part of the SEQR environmental assessment by reference. Duplicative noise analysis information is not required for the permit application and the assessment of impacts under SEQR. A proper analysis can satisfy information needs for both purposes.

C. Mitigation - Best Management Practices (BMP) for Reducing Noise

Various noise abatement techniques are available for reducing frequency of sound, duration of sound or SPLs at receptor locations. The mitigation techniques given below are listed according to what sound characteristic they mitigate.

1. Reduce noise frequency and impulse noise at the source of generation by:

   a. Replacing back-up beepers on machinery with strobe lights (subject to other requirements, e.g., OSHA and Mine Safety and Health Administration, as applicable). This eliminates the most annoying impulse beeping;

   b. Using appropriate mufflers to reduce the frequency of sound on machinery that pulses, such as diesel engines and compressed air machinery;

   c. Changing equipment: using electric motors instead of compressed air driven machinery; using low speed fans in place of high speed fans;

   d. Modifying machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces; and

2. Reduce noise duration by:

   a. Limiting the number of days of operation, restricting the hours of operation and specifying the time of day and hours of access and egress can abate noise impacts.

   b. Limiting noisier operations to normal work day hours may reduce or eliminate complaints.

Limiting hours of construction or operation can be an effective tool in reducing potential adverse impacts of noise. The impacts of noise on receptors can be

significantly reduced by effectively managing the hours at which the loudest of the operations can take place.

Implementation of hours of operation does not reduce the SPL emanating from a facility. Determining whether or not hours of operation will be effective, mitigation requires consideration of: public safety, for example road construction at night may reduce traffic concerns and facilitate work; duration of the activity, is it a one time event necessary to meet a short term goal or will the activity become an ongoing operation; and surrounding land use, consider what type(s) of land use is proximal to the activity and at what time(s) might a reduction of noise levels be necessary. There may be other factors to consider due to the uniqueness of a given activity or the type of land use adjacent to the activity. Hours of operation should also consider weekend activities and legal holidays that may change the types of land use adjacent to the permitted activity or increase traffic levels in an area.

The best results from using hours of operation as a mitigative measure will be obtained if the hours are negotiated with the owner or operator of the facility. The less noisy aspects of an operation may not have to be subject to the requirements of hours of operation such as preparing, greasing and maintaining machinery for the upcoming day's operation. The more noisy operations can be scheduled to begin when people in the receptor area are less likely to be adversely effected. Hours of operation should be included in the operation plans for a facility that becomes part of the permit, or in the event that there is no operation plan, can be included as a permit condition.

3. Reduce Noise sound pressure levels by:

   a. Increasing the setback distance.
   b. Moving processing equipment during operation further from receptors.
   c. Substituting quieter equipment (example - replacing compressed air fan with an electric fan could result in a 20 dB reduction of noise level).

d. Using mufflers selected to match the type of equipment and air or gas flow on mechanical equipment.
e. Ensuring that equipment is regularly maintained.
f. Enclosing processing equipment in buildings (example - enclosing noisy equipment could result in an 8-10 dB noise level reduction, a 9 inch brick wall can reduce SPL by 45-50 dB).
g. Erecting sound barriers such as screens or berms around the noise generating equipment or near the point of reception. The angle of deflection also increases as the height of a screen or barrier increases. Screens or barriers should be located as close to the noise source or the receptor as possible. The closer the barrier is located to the source or the receptor, the greater the angle of deflection of the sound waves will be creating a larger "sound shadow" on the side opposite the barrier. Stockpiles of raw material or finished product can be an effective sound barrier if strategically placed.
h. phasing operations to preserve natural barriers as long as possible.
i. altering the direction, size, proximity of expanding operations.
j. Designing enclosed facilities to prevent or minimize an SPL increases above ambient levels. This would require a noise analysis and building designed by a qualified engineer that includes adequate ventilation with noise abatement systems on the ventilation system.

Public notification of upcoming loud events can also be used as a form of mitigation although it doesn't fit easily into the categories above. People are less likely to get upset if they know of an upcoming event and know that it will be temporary.

The applicant should demonstrate that the specific mitigation measures proposed will be effective in preventing adverse noise effects on receptors.

D. Decision Making - Conditioning Permits to Limit Noise Impacts

Preferably, the mitigation measures as outlined in the construction and operational plans should be relied upon to mitigate the effects of noise on receptors. The permit should state that the activity will be conducted in accordance with the approved plan. Otherwise, mitigation measures and BMP's can be imposed within specific permit conditions.

It is not the intention of this guidance to require decibel limits to be established for operations where such limits are not required by regulation. There are, however, instances when a decibel limit may be established for an operation to ensure activities do not create unacceptable noise effects, as follows:

1. The review of a draft and final environmental impact statement demonstrates the need for imposition of a decibel limit;
2. A decibel limit is established by the Commissioner's findings after a public hearing has been held on an application;
3. The applicant asks to have a decibel limit to demonstrate the ability to comply; or
4. A program division seeks to establish a decibel limit as a permit condition, when necessary to demonstrate avoidance of unacceptable noise impact.

Ultimately, the final decision must incorporate appropriate measures to minimize or avoid significant noise impacts, as required under SEQR. Any unavoidable adverse effects must be weighed along with other social and economic considerations in deciding whether to approve or deny a permit.

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Additional Reading

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APPENDIX B - INSTRUMENT CALIBRATION SHEETS

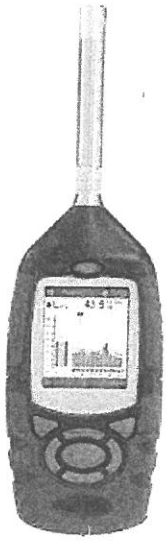
377

CASELLA

Certificate of Conformity and Calibration

FA05190

Instrument Type:-	**CEL-633C**
Serial Number	4210504
Firmware revision	V006-05
Microphone Type:-	**CEL-251**
Serial Number	05084
Preamplifier Type:-	**CEL-495**
Serial Number	005056
Instrument Class/Type:-	1



Applicable standards:-

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- *The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	**Test Engineer:-**	Nicola Cartwright
	32 %RH	**Date of Issue:-**	July 4, 2022
	1014 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

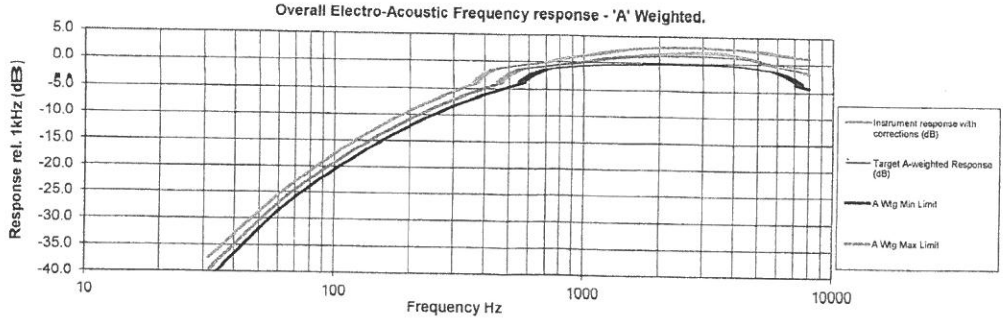
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - *A Weighted*

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Email: info@casellasolutions.cn

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 17320
Description Quest SoundPro DL-2-1/3
Calibrated 5/27/2022

Manufacturer Quest
Model Number SoundPro DL-2-1/3
Serial Number BIJ090026
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 40

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

				(As Of Cal Entry Date)	
Test Instrument ID	**Description**	**Manufacturer**	**Serial Number**	**Last Cal Date**	**Next Cal Date**
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

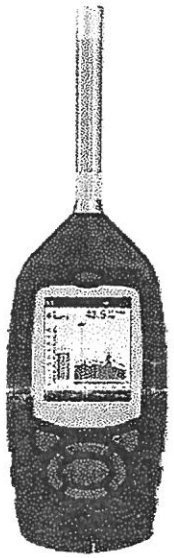
Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

CASELLA

Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	0442231		
Firmware revision	V129-09		
Microphone Type:-	CEL-252	Preamplifier Type:-	CEL-495
Serial Number	89713	Serial Number	001775
Instrument Class/Type:-	2		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	Test Engineer:-	Paul Blackwell
	25 %RH	Date of Issue:-	December 22, 2021
	1015 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

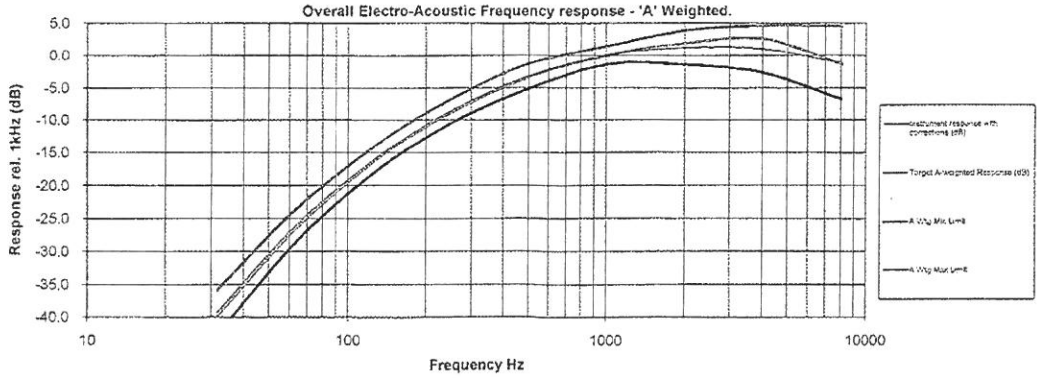
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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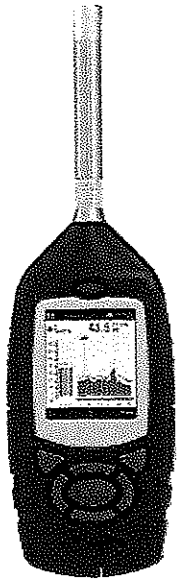
380

Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	4637949		
Firmware revision	V129-09		
Microphone Type:-	**CEL-252**	**Preamplifier Type:-**	**CEL-495**
Serial Number	60590	Serial Number	002125
Instrument Class/Type:-	**2**		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	23 °C	**Test Engineer:-**	Paul Blackwell
	33 %RH	**Date of Issue:-**	December 14, 2021
	1021 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

Test Summary:-

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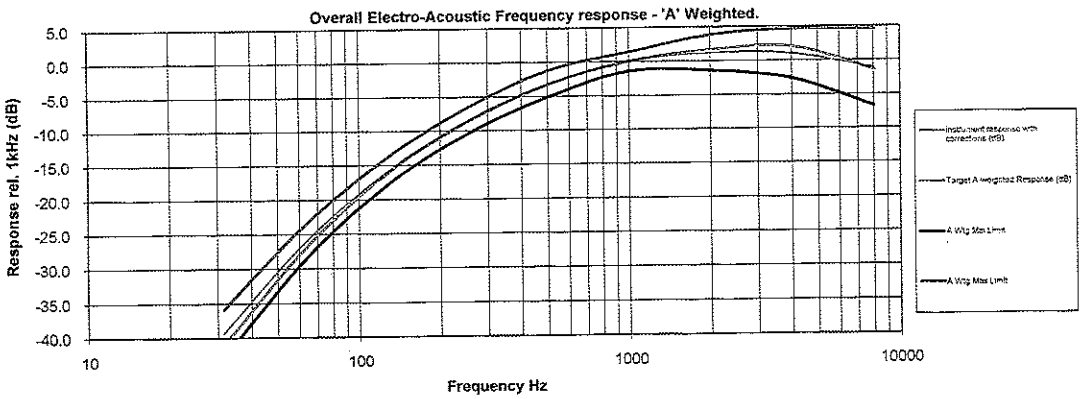
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Fax: +44(0) 1234 841490
E-mail: info@casellasolutions.com

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415 Lawrence Bell Drive, Unit 4 Buffalo, NY 14221, USA
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Tel: +1 (716) 276 3040
E-mail: info@casellausa.com

Casella India
Ideal Industries India Pvt.Ltd.
229-230, Spazedge, Tower -B Sohna Road, Sector-47, Gurgaon-122001, Haryana , India.
Tel: +91 124 4495100
E-mail: casella.sales@ideal-industries.in

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Room 305, Building 1, No.1279, Chuanqiao Rd, Pudong New District, Shanghai, China
Tel: +86-21-31263186
Fax: +86-21-61605905
Email: info@casellasolutions.cn

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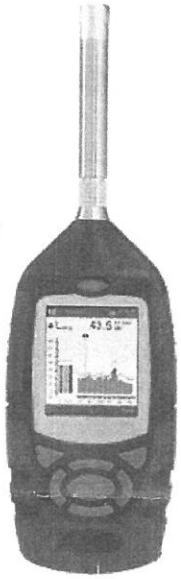
Certificate of Conformity and Calibration



Instrument Model:- CEL-633C

Serial Number 2145334
Firmware revision V129-09

Microphone Type:- CEL-251
Serial Number 5766

Preamplifier Type:- CEL-495
Serial Number 004239

Instrument Class/Type:- 1

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-

23 °C
29 %RH
999 mBar

Test Engineer:- Paul Blackwell
Date of Issue:- April 12, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

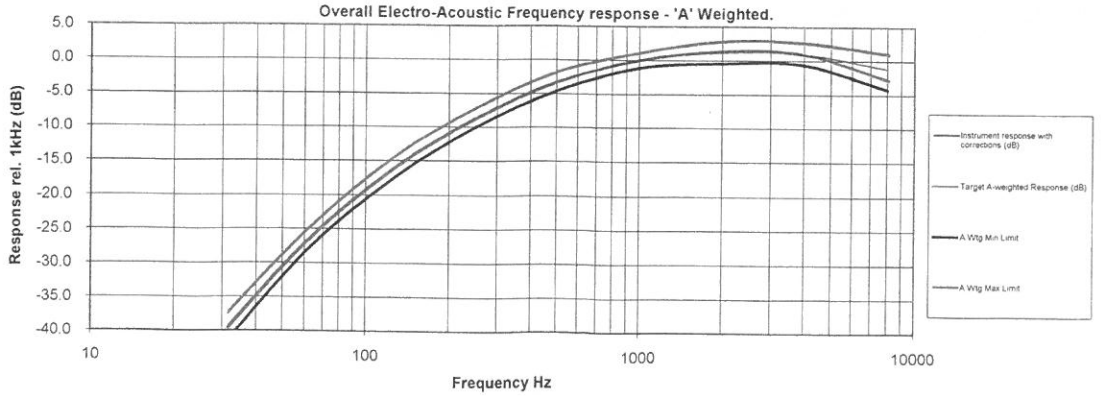
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Casella China
Ideal Industries China
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Fax: +86-21-61605906
Email: info@casellasolutions.cn

CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-120/1
Serial Number:	5230919
Job Number:	25508
Date of Issue:	12-Apr-2022
Engineer:	P Blackwell

Traceable Equipment:		
	Reference Calibrator	EQ11085
	DVM type Fluke 45	EQ00318

Test Conditions:

Ambient Temperature	23.0	°C
Ambient Humidity	29.0	%RH
Ambient Pressure	999	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.04 dB	N/A dB	1.0000 kHz
Final Reading	114.00 dB	N/A dB	1.0000 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

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Casella India
IDEAL Industries India Pvt. Ltd
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Tel: +91 124 4495100
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Fax: +86 21 61605906
E: Info@casellasolutions.cn

Casella Australia
IDEAL Industries (AUST) Pty. Ltd
Unit 17, 35 Dunlop Rd, Mulgrave. VIC 3170, Australia
Tel: +61 3 9562 0175
E: australia@casellasolutions.com

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 5392
Description Quest QC-10 Acoustic Calibrator
Calibrated 5/26/2022

Manufacturer Quest
Model Number QC-10
Serial Number QID050172
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 35

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

APPENDIX C -
PHOTO LOG

Photo 1: M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad.



Photo 2: M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad.



Photo 3: M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad.



Photo 4: M-4 – Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad.



Photo 5: M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad.

APPENDIX D -
MODEL DATA

SOUND SOURCE

SOURCE	SOUND POWER LEVEL dBA	HEIGHT ABOVE GROUND (m)
M109A3GN (155 mm) Howitzer	176	2

MODEL CONFIGURATION

MODEL PARAMETER	SETTINGS
Atmospheric Absorption	20°C / 70% Humidity
Ground Absorption	0.7G Ground Factor
Receiver Height	1.5 meters for sound level isolines and receivers
Model Radius	3,218 m

MODELED SOUND LEVEL AT RECEIVERS

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	75	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	107	1.5

APPENDIX E -
Noise emission data for M109, 155 mm field howitzer

https://www.ffi.no/no/Rapporter/07-02530.pdf

APPENDIX E – 2022 BALLISTICS TEST RANGE SOUND ANALYSES SCOPE OF WORK

H2H GEOSCIENCE ENGINEERING

179 River Street, Troy, New York 12180

Environmental Professionals
Geologic Consultants
Construction Services

(518) 270-1620/Fax (518) 270-1672

November 9, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analysis at the above reference site.

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following Scope of Work (SOW).

Scope of Work

H2H intends to collect ambient (no unapproved UCI operations taking place) sound levels, as well has additional sound level modeling to support a revised sound study, to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application.

Task 1: Sound Level Monitoring

H2H has developed a Site Overview Map (Figure 1) showing all identified receptors within a two-mile radius (Project Area) of the ballistics testing Firing Pad. The Firing Pad (100 ft. by 100 ft.) is in the northeast corner of parcel 38.1-1-31.000 (UCI Site). The Control Operations Area is located adjacent to the Firing Pad; the Target Area is located 590 ft. west of the Firing Pad (Figure 2).

Forty-two Residential Receptors (occupied residential structure) were identified with the two-mile radius. Four parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius.

Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Firing Pad to best determine ambient sound level conditions in the Project Area. H2H will conduct sound level monitoring at each of the identified five-monitoring location (Figure 1) to identify, and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for the area surrounding each monitoring location.

The following is a description of each sound monitoring location:

M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-2 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surround Pulsifer Rd.

M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

M-4 - Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Task 2: Sound Level Modeling

Based on source sound level data (loudest kinetic systems to be tested) provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURES

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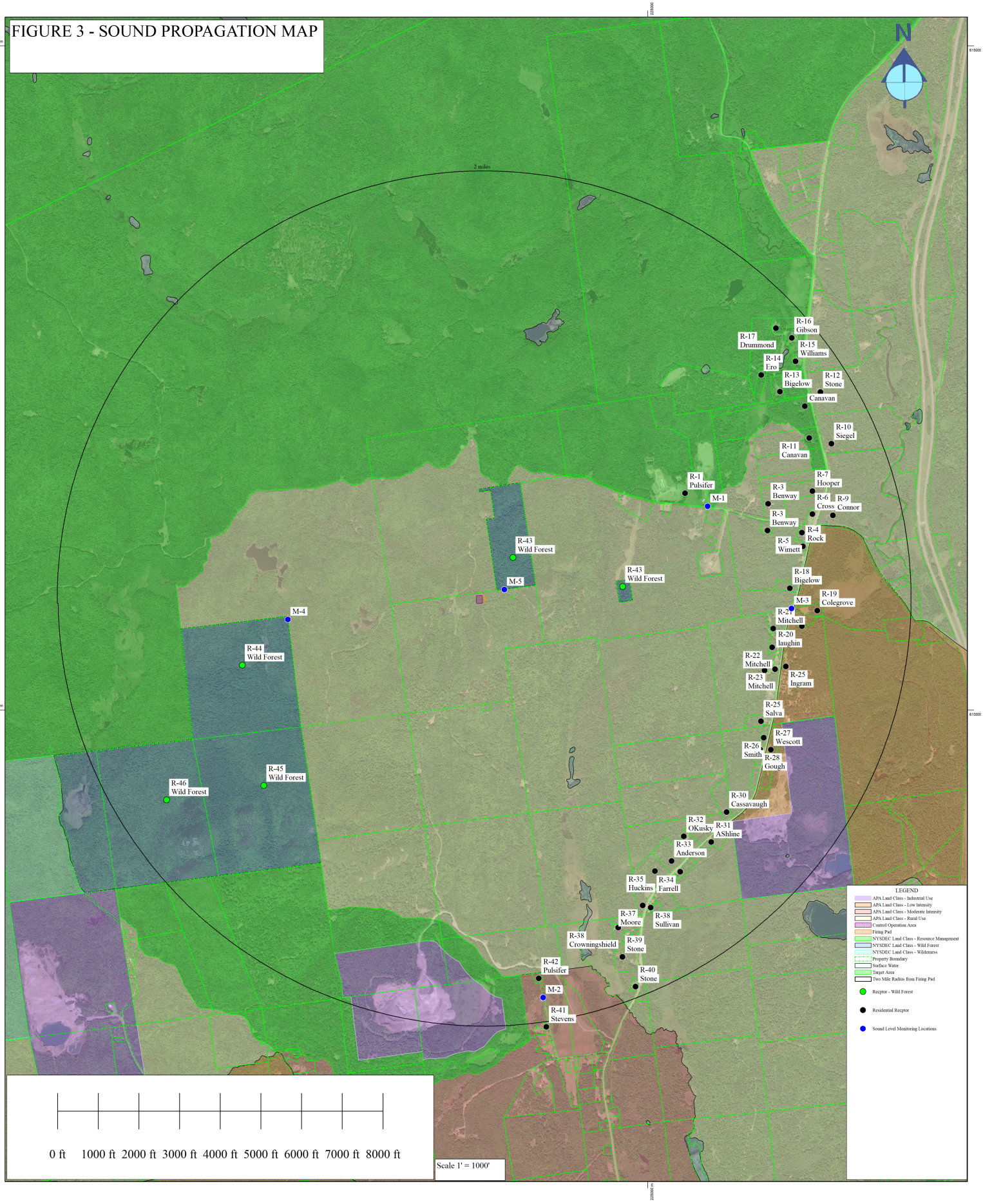
FIGURE 3 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
M-1
R-7 Hooper
R-3 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
R-43 Wild Forest
M-5
R-18 Bigelow
M-3
R-19 Colegrove
M-4
R-21 Mitchell
R-20 laughin
R-44 Wild Forest
R-22 Mitchell
R-23 Mitchell
R-25 Ingram
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-42 Pulsifer
R-40 Stone
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Recptor - Wild Forest
Residential Recptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1' = 1000'

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FIGURE - 2 SITE MAP



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APA EPS Letter 4
8/16/2023

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August 16, 2023

Matthew D. Norfolk, Esq.
1936 Saranac Ave, Suite 106
Lake Placid, NY 12946

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received on August 1, 2023. The submission provided important information in response to the Agency's March 16, 2023 Fourth Notice of Incomplete Permit Application (NIPA). As a result, Item 1 of the March 16, 2023 NIPA is either satisfied or no longer required.

As further outlined below, the remaining information required by the Agency's March 16, 2023 NIPA is still required to review the application. A copy is enclosed for your convenience. You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

Specifically, the provided response does not address the following:

- Noise mitigation measures are not proposed or evaluated. The submission states that "(T)here are no other practicable means to mitigate noise from a noise source such as the one being tested." This statement is un-supported given that berms, enclosures, and/or silencers (schalldampfer), or any other potential noise mitigation measures are not discussed or evaluated, and no documentation has been provided supporting the assertion that noise mitigation measures are not practicable.

- The provided response does not evaluate varying weather conditions, changes in wind direction and speed, temperature and humidity and atmospheric inversions as requested. The submission only states that the noise model accounted for appropriate weather conditions per ISO specifications with no further details.

- Only the noise model outputs were provided for receptor locations M-1 through M-5, and not the previously requested empirical sound pressure level calculations for each of the receptor locations. Absent these calculations, the model results are unsupported. In addition, the modeled noise results as depicted in Figure 5 of the response appears to be depicted at an inaccurate scale. As previously requested in the June 6, 2022 Third NIPA and March 16, 2023 Fourth NIPA and as discussed during our July 25, 2022 and June 26, 2023 meetings, provide all empirical sound pressure level calculations for each of the receptor locations.

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- The Norwegian study, a 45-page report titled “Noise emission data for M109, 155 mm field howitzer”, prepared by the Norwegian Defence Research Establishment (FFI), dated 5 December 2007, is the sole source of data inputs for the provided noise assessment which is based upon a simulated and modeled study utilizing a detonation of 1 kg of TNT 35 m (114 ft) from the source location of a howitzer. The provided revised noise assessment is based upon further modeling of the Norwegian study findings, stating that “(T)he Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB showing correlation within ISO standards.” In effect, the provided revised noise assessment asserts that a 3.5 dB modeled discrepancy is tolerable for estimating noise impacts from firing military grade weapons within proximity to State Land and residential receptors. The provided noise assessment also utilizes a revised calculated noise source of 180.8 dB at the howitzer barrel. However, as previously requested, the calculations were not provided to support this component. The closest receptor location of M-5, which represents a receptor on State Land classified as Wild Forest has a modeled estimated noise level of 130 dB. However, as previously acknowledged, the model has an at least 3.5 dB discrepancy from the Norwegian study results, therefore it can be reasonably assumed based on the limited information provided that the M-5 receptor location can exhibit up to 133.5 dB, which exceeds the US Bureau of Mining’s Report 8507 standard of 133 dB for over air blasts associated with mining activities as referenced in NYSDEC mining permit conditions. Also, please note that this location is approximately 510 feet from the firing pad, and not at the worst-case scenario location of the southwest corner of the same state land parcel approximately 300 feet from the northeast corner of the firing pad. Therefore, based on the information provided to date, the weapons firing activity proposal as presented has the potential to create an undue adverse impact for howitzer impulse noise levels greater than 133 dB on State Land classified as Wild Forest. The assertion that this parcel is landlocked State land with no public means of access is irrelevant to the Agency’s evaluation of potential for adverse impact upon the park’s natural resources, specifically § 805.4.a(4) of the Adirondack Park Agency Act. The necessary information has not been provided to indicate that there will not be an undue adverse impact from the proposal to fire a M109A3GN 155mm field howitzer up to 2 times per day up to 3 days in a row, for an average of 30 times per year for 5 years, as close as approximately 300 ft as measured from the corner of the proposed 100-foot by 100-foot gravel firing pad to the corner of State Land Classified as Wild Forest.

- The response “The level of sound for all charge sizes employed will not exceed those acceptable levels determined by H2H’s assessments and testing.” does not provide the requested comparison between previously referenced charges used in testing or what the maximum charge to be used in the proposed testing will be.

  Therefore, based on the provided information regarding potential noise impacts to date, this project does not meet the criteria for issuance of a permit under Agency law and staff cannot recommend approval to the Agency board.

If you have any questions regarding this letter or the project review process, please contact me at (518) 304-6149.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

Attachment: March 16, 2023 NIPA

cc: Michael Hopmeier
Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

4th NIPA Response - December 2023

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UCI's Response

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: December 15, 2023

New York State Adirondack Park Agency
KATHY HOCHUL Governor
BARBARA RICE Executive Director

August 16, 2023

Matthew D. Norfolk, Esq.
1936 Saranac Ave, Suite 106
Lake Placid, NY 12946

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received on August 1, 2023. The submission provided important information in response to the Agency's March 16, 2023 Fourth Notice of Incomplete Permit Application (NIPA). As a result, Item 1 of the March 16, 2023 NIPA is either satisfied or no longer required.

As further outlined below, the remaining information required by the Agency's March 16, 2023 NIPA is still required to review the application. A copy is enclosed for your convenience. You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

Specifically, the provided response does not address the following:

- Noise mitigation measures are not proposed or evaluated. The submission states that "(T)here are no other practicable means to mitigate noise from a noise source such as the one being tested." This statement is un-supported given that berms, enclosures, and/or silencers (schalldampfer), or any other potential noise mitigation measures are not discussed or evaluated, and no documentation has been provided supporting the assertion that noise mitigation measures are not practicable.

RESPONSE: A 13 ft. tall berm (Sound Mitigation Berm) will be constructed along the northern boundary of the Firing Pad (Figure 2). Modeled results of the M109 with the berm incorporated are shown on Figure 4 and in Section 4.2 Table 2a/2b of the September 2023 Sound Study

- The provided response does not evaluate varying weather conditions, changes in wind direction and speed, temperature and humidity and atmospheric inversions as requested. The submission only states that the noise model accounted for appropriate weather conditions per ISO specifications with no further details.

RESPONSE: The sound propagation model accounts for appropriate weather conditions following ISO 9613-2 Specifications Including:

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- Moderate downwind propagation defined as a wind direction within an arc of 90 degrees with the wind blowing from the source.
- Wind speeds up to 11 M.P.H measured 9-36 feet above the ground.
- A moderate ground-based temperature inversion.

(July 2023 Sound Study Section 4.1.1 Page 8)

To evaluate how fluctuations in temperature and humidity affect modeled sound levels the following scenarios shown in Table 1 were modeled. The first column (Temperature 68ºF / Humidity 70%) represents the conditions used in the sound study and are typical for the project site during summer months. The maximum difference from modeled conditions is 3 dB(A) at M-4 and M-2 (Temperature 41ºF / Humidity 0%) testing is not anticipated to take place under these conditions.

Table 1: Moddled M109 Sound Levels (with Sound Mitigation Berm) dB(A) by Temperature and Humidity

Monitoring Location	Molded dB(A) Sound Level				
	Temperature 68°F / Humidity 70% (used in sound study)	Temperature 41°F / Humidity 95%	Temperature 41°F / Humidity 0%	Temperature 95°F / Humidity 0%	Temperature 95°F / Humidity 95%
M-1	67	68	67	66	67
M-2	71	72	74	72	71
M-3	73	74	75	73	73
M-4	80	81	83	82	79
M-5	100	100	101	101	100

- Only the noise model outputs were provided for receptor locations M-1 through M-5, and not the previously requested empirical sound pressure level calculations for each of the receptor locations. Absent these calculations, the model results are unsupported. In addition, the modeled noise results as depicted in Figure 5 of the response appears to be depicted at an inaccurate scale. As previously requested in the June 6, 2022 Third NIPA and March 16, 2023 Fourth NIPA and as discussed during our July 25, 2022 and June 26, 2023 meetings, provide all empirical sound pressure level calculations for each of the receptor locations.

RESPONSE: Table 2 shows the calculated sound pressure levels based on the Sound Source (M109) power level and distance to each monitoring location using the following formula. The results shown in Table 2 are the calculated sound pressure levels accounting for impedance of air only.

$$L_p = L_W - |10 \cdot \log\left(\frac{Q}{4\pi \cdot r^2}\right)|$$

Lp= Sound Pressure Level
Lw= Sound Power level = 163.2 dB(A) (barrel of the M109, 155mm howitzer)
Q= Directivity factor = 2 (Hemispherical Sound Propagation)
r= distance to source (meters)

Table 2: Sound Power Level to Sound Pressure Level Calculation

Monitoring Location	Distance From Sound Source (ft.)	Calculated Sound Pressure Level dB(A)
M-1	**5,955**	**90**
M-2	**9,925**	**86**

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M-3	**7,726**	**88**
M-4	**4,908**	**92**
M-5	**554**	**111**

NYSDEC Assessing and Mitigating Noise Impacts guidance document recommends using empirical sound level calculations for First Level Noise Impact Evaluations only. The NYSDEC recommends using a model for projects that require further evaluation by factoring in any additional noise attenuation that will be provided by existing natural topography, berms, vegetation, etc. H2H developed a sound propagation model to adhere to NYSDEC guidance criteria. All input data and results of the sound propagation models are attached as Appendix F.

Sound Study figures have been updated to reflect the correct scale. Figure 5 was plotted to an inaccurate graphical scale when plotting to PDF. Previously reported modeled sound pressure levels are correct.

- The Norwegian study, a 45-page report titled “Noise emission data for M109, 155 mm field howitzer”, prepared by the Norwegian Defense Research Establishment (FFI), dated 5 December 2007, is the sole source of data inputs for the provided noise assessment which is based upon a simulated and modeled study utilizing a detonation of 1 kg of TNT 35 m (114 ft) from the source location of a howitzer. The provided revised noise assessment is based upon further modeling of the Norwegian study findings, stating that “(T)he Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB showing correlation within ISO standards.” In effect, the provided revised noise assessment asserts that a 3.5 dB modeled discrepancy is tolerable for estimating noise impacts from firing military grade weapons within proximity to State Land and residential receptors. The provided noise assessment also utilizes a revised calculated noise source of 180.8 dB at the howitzer barrel. However, as previously requested, the calculations were not provided to support this component. The closest receptor location of M-5, which represents a receptor on State Land classified as Wild Forest has a modeled estimated noise level of 130 dB. However, as previously acknowledged, the model has an at least 3.5 dB discrepancy from the Norwegian study results, therefore it can be reasonably assumed based on the limited information provided that the M-5 receptor location can exhibit up to 133.5 dB, which exceeds the US Bureau of Mining’s Report 8507 standard of 133 dB for over air blasts associated with mining activities as referenced in NYSDEC mining permit conditions. Also, please note that this location is approximately 510 feet from the firing pad, and not at the worst-case scenario location of the southwest corner of the same state land parcel approximately 300 feet from the northeast corner of the firing pad. Therefore, based on the information provided to date, the weapons firing activity proposal as presented has the potential to create an undue adverse impact for howitzer impulse noise levels greater than 133 dB on State Land classified as Wild Forest. The assertion that this parcel is landlocked State land with no public means of access is irrelevant to the Agency’s evaluation of potential for adverse impact upon the park’s natural resources, specifically § 805.4.a(4) of the Adirondack Park Agency Act. The necessary information has not been provided to indicate that there will not be an undue adverse impact from the proposal to fire a M109A3GN 155mm field howitzer up to 2 times per day up to 3 days in a row, for an average of 30 times per year for 5 years, as close as approximately 300 ft as measured from the corner of the proposed 100-foot by 100-foot gravel firing pad to the corner of State Land Classified as Wild Forest.

RESPONSE: As stated on page three of UCI’s Fourth NIPA response the Sound Source sound level used in analyses performed by H2H Geoscience Engineering (“H2H”) is without ground corrections. Uncorrected data has a higher sound pressure level than corrected data providing a conservative (i.e. potentially louder) sound level model (*see* Appendix E, Table E.1, free field, *compared to* Table E.2, without ground correction).

The goal of the analyses was to develop data that could be used to model the attenuation of sound produced by a howitzer due to the previous lack of available information. The results of the Norwegian Defense Research Establishments (FFI) study demonstrated correlation with their recorded sound levels from the field (data used in H2H’s analyses) and proved to be suitable for use in the FFI database.

The sound power level of the Source was calculated based on the sound pressure levels shown in Table E.2 of Appendix E (Noise Emission Data for M109, 155mm Field Howitzer). The sound pressure levels shown in Table E.2 were measured at 245 meters from the sound source by seven sensor positions at increasing angles from the direction of fire. Sensor 1 is positioned 32 degrees from the direction of fire and recorded a sound pressure level of 130.5 dB (loudest recorded sound level across the seven sensors) at 245 meters. The data shown in Table E.2 was produced taking the average of 15 shots. Using industry standard calculations, the sound

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power level at the sound source (barrel of the M109, 155mm howitzer) was calculated to be 180.8 dB (163.2 dB(A)).

No “simulated and modeled” data was used when calculating the sound power level for the Sound Source from the data shown in Table E.2.

Table 3 Shows the recorded sound pressure level from Table E.2 for each frequency indicated. The sound power level was calculated using the following formula.

$$L_W = L_p + |10 \cdot \log\left(\frac{Q}{4\pi \cdot r^2}\right)|$$

Lp= Sound Pressure Level = recorded sound pressure level from Table E.2
Lw= Sound Power level
Q= Directivity factor = 1 (Spherical Sound Propagation)
r= distance to source = 245 meters

The calculated A-weighted sound power level was calculated by adding/subtracting the dB(A) Filter to the calculated sound pressure level.

The resulting total sound level 180.8 dB / 163.2 dB(A) is calculated using the formula below and the calculated sound power levels show in table 3.

$$L_\Sigma = 10 \cdot \log_{10}\left(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}} + \cdots + 10^{\frac{L_n}{10}}\right) \text{ dB}$$

Lε = Sum level of sound 180.8 dB(A) / 163.2 dB(A)
L_n = Sound pressure from sperate sources

Table 3: Recorded Sound Pressure level / Calculated Sound Source Power level

Frequency (Hz)	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**
Recorded M109 Sound Pressure Level (dB) 245 m	120.4	116.5	105.7	90.3	101.2	99.9	96.4	93.1	88.8	86.1
Calculated Sound Power Level (dB)	179.1	175.3	164.5	149.1	160.0	158.7	155.2	151.9	147.6	144.9
Calculated Sound Power Level (dB(A))	139.6	149.1	148.4	140.5	156.8	158.7	156.4	152.9	146.5	138.3
dB(A) Filter	-39.5	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	-6.6

The modeled sound pressure level at M-5 is 130 dB / 107 dB(A) and 132 db and 111 dB(A) at State Land classified as Wild Forest property corner. With the additional mitigative affects of the Sound Mitigation Berm (Figure 4) the sound pressure level at M-5 is 124 dB / 100 dB(A) and 127 db / 102 dB(A) at State Land classified as Wild Forest property corner. The State Land classified as Wild Forest property corner is 350 ft. from the center of the 100-foot by 100-foot gravel firing pad.

As stated on page 10 section 5.0 of the July 2023 Sound Study three currently permitted hard rock mining operations exist within a 2.1-mile radius of the Site. Hard rock mining operations require regular blasting as part of their weekly operations, under the mines NYSDEC Mine Land Reclamation Permit an air blast limit of 133 dB measured to the **closest structure outside the permit area is permitted**. Specific language from NYSDEC MLR Permit reads – Air blast shall not exceed 133 db at the location of any dwelling, public building, school, church, or community or institutional building outside the permit area. There are no structures on the parcel classified as

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State Forest. The closest structure to the Firing pad is the Pulsifer residents (R-1) 5,200 ft. to the northeast with a modeled impulse sound level of 101 dB / 69 dB(A) implementing the Sound Mitigation Berm.

- The response “The level of sound for all charge sizes employed will not exceed those acceptable levels determined by H2H’s assessments and testing.” does not provide the requested comparison between previously referenced charges used in testing or what the maximum charge to be used in the proposed testing will be.

  Therefore, based on the provided information regarding potential noise impacts to date, this project does not meet the criteria for issuance of a permit under Agency law and staff cannot recommend approval to the Agency board.

If you have any questions regarding this letter or the project review process, please contact me at (518) 304-6149.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

Attachment: March 16, 2023 NIPA

cc: Michael Hopmeier
Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

September 2023 Sound Study

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SOUND STUDY

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: December 15, 2023

UNCONVENTIONAL CONCEPTS, INC.

APA PROJECT #2021-0276

Prepared for:
Unconventional Concepts, Inc.
620 Herndon Parkway, Suite 120A
Herndon, VA 20170

Prepared by:

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September 2023

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1.0 INTRODUCTION

Unconventional Concepts, Inc. (UCI) has proposed to the Adirondack Park Agency (APA), an application for the operation of a projectile testing range in Lewis, New York. The range (Site) is at 195 Hale Hill Lane (Figure 1). H2H Geoscience Engineering, PLLC (H2H) prepared this report to identify and evaluate the potential impacts of off-site sound propagation from the proposed application. The potential sound impacts associated with the application were assessed in accordance with the requirements set forth by the Adirondack Park Agency (APA) and the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT BACKGROUND

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. The range will be developed to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance.

This effort will focus on the test and evaluation of these new systems in support of a critical US Army research program managed by Benét Laboratories at Watervliet Arsenal in Albany, NY. The project will focus on the instrumentation and firing of these systems in a constrained area to allow for measurement and assessment of the internal ballistics and kinetic and kinematic effects of these modern designs.

All test equipment and instrumentation will be portable; equipment will be deployed as needed to the Site for a test and will then be completely removed at the end of the test.

The testing schedule is as follows:

- A shot will only be fired on weekdays between the hours of 10:00 AM and 4:00 PM.
- A maximum of two shots will be fired in one day.
- Shots will be fired a maximum of three consecutive days.
- Testing is anticipated to continue for a period of five years, with an average of 30 shots per year.

The Site is on land owned by Pulsifer Logging, LLC (38.1-1-31.000). UCI is using the land with the landowner's (written) permission. The Sound Source (155 mm howitzer barrel assembly) will be located on a 100 ft. X 100 ft. crushed gravel pad (Firing Pad). A haul truck will be used to transport the barrel assembly to the firing pad. The Operations Control Area is adjacent to the Firing Pad; the Target Area is 590 ft. east of the Firing Pad (Figure 2). The 155 mm howitzer barrel assembly and the Haul Truck are the only sources of sound that could produce a potential signific environmental impact associated with the project.

The Site is accessed via an access road off Hale Hill Road. The area surrounding the Site is heavily forested with a topographic high to the east and south. NYS Route 9 is located approximately 7,000 ft. to the east. Within a two-mile radius of the site (Project Area) forty-four Residential Receptors (RR) were identified. The closest RR is the Pulsifer residents (R-1) 5,200 ft. to the northeast off Hale Hill Road. Five parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius (Figure 1).

H2H developed a Scope of Work (SOW) approved by the APA specifying the locations sound level monitoring was conducted. The SOW incorporating the APA's November 28, 2022 comments on the location of Monitoring location M-3 and M-4 is attached as Appendix E.

3.0 SOUND LEVEL MONITORING

Sound level monitoring was conducted by H2H on December 20, 2022, and December 21, 2022. Monitoring was conducted at the five locations identified in the SOW (Figure 1).

3.1 ENVIRONMENTAL CONDITIONS

Weather data was collected from a weather station located at The Silo (Figure 1).

3.1.1 December 20, 2022

During the study period, the weather conditions included temperatures between 27 °F and 31 °F, winds out of the south between zero and six miles per hour, 70% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.1.2 December 21, 2022

During the study period, the weather conditions included temperatures between 23 °F and 32 °F, winds out of the southwest between zero and four miles per hour, 75% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.2 MONITORING EQUIPMENT

Sound level measurements were recorded using calibrated Casella CEL-633 ANSI or Quest SoundPro DL-2-1/3 sound level meters. Each monitor was set to log A-weighted, fast response, at one-second intervals. Each Casella monitor was programed to record audio to aid in identifying sound sources. Each unit was field calibrated before each monitoring event; each unit was also laboratory-qualified, technician calibrated (Appendix B). Each meter was tripod mounted at an approximate height of 5 feet, microphones were covered with windscreens. Monitors were outfitted with external batteries.

3.3 MONITORING LOCATION SOUND LEVELS

Sound levels were collected as discussed in Section 3.2 at each monitoring location between 10:00 a.m. – 4:00 p.m. (proposed testing hours). Sound level data was cleaned to remove anomalous sound sources, and data outside monitoring periods. Staffed sound level monitoring was conducted at each monitoring location to log the relative loudness, and the types of sounds that could be heard at each monitoring location. Photos of each monitoring location are provided in appendix B.

3.3.1 Monitoring Location M-1 –

Monitoring location M-1 is adjacent to Residential Receptor R-1 on Hale Hill Road at elevation 705 ft. amsl. 5,800 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-1 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-1 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic on Hale Hill Rd. to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 81.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 56.7 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 27.5 to 83.0 dBA.
- The average equivalent continuous sound level (L_{eq}) was 57.2 dBA

3.3.2 Monitoring Location M-2 -

Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surrounding Pulsifer Rd.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9 and Pulsifer Road,

- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 24.8 to 70.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 42.5 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 25.0 to 70.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.8 dBA

3.3.3 Monitoring Location M-3

Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9,

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.2 to 82.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 59.6 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9,

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 26.1 to 86.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 61.2 dBA

3.3.4 Monitoring Location M-4

Monitoring Location M-4 is southwest of the Firing Pad next to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 18.1 to 70.7 dBA.
- The average equivalent continuous sound level (L_{eq}) was 39.1 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 19.5 to 71.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.9 dBA.

3.3.5 Monitoring Location M-5

Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.6 to 65.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 37.2 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.8 to 58.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 34.7 dBA.

4.0 SOUND PROROGATION MODEL

4.1.1 Sound Source (M109A3GN 155mm Field Howitzer)

A sound propagation model was developed for the area within a two-mile radius of the Firing Pad using the International Standards Organization ISO 9613 -1,2,3 standards applied in the dBmap.net noise mapping tool. The model accounts for surface reflection and absorption, atmospheric absorption, geometric divergence, weather conditions, topography, and source sound power level.

The sound power level of the Source was calculated based on the sound pressure levels shown in Table E.2 of Appendix E (Noise Emission Data for M109, 155mm Field Howitzer). The goal of the analyses was to develop data that could be used to model the attenuation of sound produced by a howitzer due to the previous lack of available information. The results of the Norwegian Defense Research Establishments (FFI) study demonstrated correlation with their recorded sound levels from the field (data used in H2H's analyses) and proved to be suitable for use in the FFI database.

The sound pressure levels shown in Table E.2 were measured at 803 ft. (245 meters) from the sound source by seven sensors positions at increasing angles from the direction of fire. Sensor 1 is positioned 32 degrees from the direction of fire and recorded a sound pressure level of 130.5 dB (loudest recorded sound level across the seven sensors) at 803 ft. (245 meters). The data shown in table E.2 was produced taking the energy mean of 15 shots. Using industry standard calculations, the sound power level at the Sound Source (barrel of the M109, 155mm howitzer) was calculated to be 180.8 dB (163.2 dB(A)). The Sound Source sound level is without ground corrections. Uncorrected data has a higher sound presser level than corrected

data providing a conservative sound level model (see Appendix E, Table E.1, free field, compared to Table E.2, without ground correction).

Table 3 Shows the recorded sound pressure level from Table E.2 for each frequency indicated. The sound power level was calculated using the following formula.

$$L_W = L_p + \left|10 \cdot \log\left(\frac{Q}{4\pi \cdot r^2}\right)\right|$$

Lp= Sound Pressure Level = recorded sound pressure level from Table E.2
Lw= Sound Power level
Q= Directivity factor = 1 (Spherical Sound Propagation)
r= distance to source = 245 meters

The calculated A-weighted sound power level was calculated by adding/subtracting the dB(A) Filter to the calculated sound pressure level.

The resulting total sound level 180.8 dB / 163.2 dB(A) is calculated using the formula below and the calculated sound power levels show in table 1.

$$L_\Sigma = 10 \cdot \log_{10}\left(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}} + \cdots + 10^{\frac{L_n}{10}}\right) \text{ dB}$$

Lε = Sum level of sound 180.8 dB(A) / 163.2 dB(A)
L_n = Sound pressure from sperate sources

Table 1: Recorded Sound Pressure level / Calculated Sound Source Power level

Frequency (Hz)	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**
Recorded M109 Sound Pressure Level (dB) 245 m	120.4	116.5	105.7	90.3	101.2	99.9	96.4	93.1	88.8	86.1
Calculated Sound Power Level (dB)	179.1	175.3	164.5	149.1	160.0	158.7	155.2	151.9	147.6	144.9
Calculated Sound Power Level (dB(A))	139.6	149.1	148.4	140.5	156.8	158.7	156.4	152.9	146.5	138.3
dB(A) Filter	-39.5	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	-6.6

All input and results of the sound propagation model are attached as Appendix F.

The Image below (Image 1) demonstrates the accuracy of the sound propagation model. Image 1 shows the modeled sound pressure level (not A-weighted) at M-5 (same location as shown on Figure 3) and a receiver located 803 ft. (245 meters) west of the source labeled “Test Point.” The sound source (barrel of the M109, 155mm howitzer (180.8 dB), and all model parameters are unchanged. The Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB showing correlation within ISO standards.

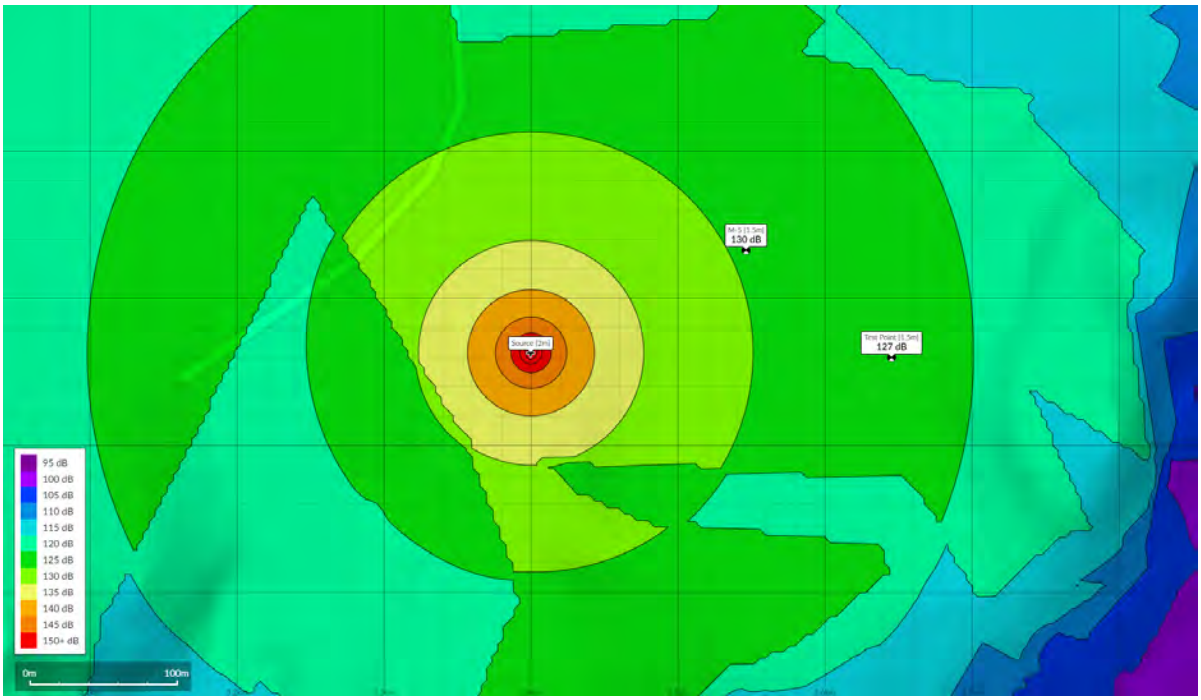

Image 1 – Modeled sound pressure level (not A- weighted) with Test Point

The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and Sound Source height of 6.5 feet is used. This field howitzer model is typical for its type and would represent the noisiest field howitzer tested on Site. The modeled scenario shows the M109A3GN firing from the Firing Pad (only location Sound Source will be operated) as shown on Figure 2. Appendix D summaries model input data.

The sound propagation models show the modeled impulse sound level produced by the Sound Source; the duration of the impulse sound level is approximately 4 milliseconds. Model results are shown without a 13-foot berm (Sound Mitigation Berm) north of the firing pad (Figure 3) and with the Sound Mitigation Berm north of the firing pad (Figure 4). The location of the Sound Mitigation Berm is shown on Figure 2. Sound pressure levels are A-weighted and shown in the form of isolines in 5 dB intervals from 45 dB(A) to 130 dB(A). Modeled sound levels at each monitoring location are labeled.

4.1.2 40-ton Haul Truck

A sound propagation model was developed for the same two-mile radius of the Firing Pad following the same standards. The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and sound source height of 6.5 feet is used. The sound power level used for the 40-ton Haul Truck (117.6 dB / 115.7 dB(A) is provided in the dBmap database. The Sound Mitigation Berm was not used for the 40-ton haul truck sound propagation model. Appendix D summaries model input data.

The 40-ton Haul Truck being modeled is similar to or louder than the haul truck that will be used to transport the barrel assembly and measurement equipment to the Firing Pad. Figure 5 shows the access road the Haul Truck will be operating on to access the Firing Pad. The Haul Truck was modeled operating at three

locations on the access road that would have the highest modeled sound level at identified receptors due to proximity and topography.

The sound propagation model shows the modeled sound level produced by the 40-ton Haul Truck (Figure 5). Sound levels are A-weighted and shown in the form of isolines in 5 dB intervals from 20 dB(A) to 85 dB(A). Modeled sound levels at each monitoring location are labeled.

4.2 EFFECT ON AMBIENT SOUND LEVELS

4.2.1 Sound Source (M109A3GN 155mm Field Howitzer)

To measure the effect the modeled impulse sound (shot fired from the howitzer) would have on ambient sound levels within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. The $L_{eq, 1\text{-}sec}$ recorded sound levels were exported to allow each $L_{eq, 1\text{-}sec}$ sound level over the monitoring period (10:00 a.m. to 4:00 p.m.) to be viewed individually. To measure how impulse sound levels would affect the ambient sound level at each monitoring location the modeled impulse sound level without the Sound Mitigation Berm (Figure 3) and with the Sound Mitigation Berm (figure 4) at each monitoring location is input into the ambient data for that monitoring location. This was done twice to model the effect of two impulse sound levels (two shots per day). The results of each modeled scenario are compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

Table 2a: Tuesday, December 20, 2022, Howitzer Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer (Sound Source)			155 mm Howitzer (Sound Source) With Sound Mitigation Berm		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	57.2	75	57.2	0	67	57.2	0
M-2	42.5	71	42.8	0.3	71	42.8	0.3
M-3	59.6	73	59.6	0	73	59.6	0
M-4	39.1	79	41.9	2.8	79	41.9	2.8
M-5	37.2	107	66.7	29.5	100	59.7	22.5

Table 2b: Wednesday, December 21, 2022, Howitzer Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer			155 mm Howitzer (Sound Source) With Sound Mitigation Berm		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	56.7	75	56.8	0.1	67	56.7	0
M-2	40.8	71	41.2	0.4	71	41.2	0.4
M-3	61.2	73	61.2	0	73	61.2	0
M-4	40.9	79	42.9	2	79	42.9	2
M-5	34.7	107	66.7	32	100	59.7	25

4.2.2 40-ton Haul Truck

To measure the effect the modeled sound (Haul Truck operating on site access road) would have on ambient sound level within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. Figure 5 and Table 3a / Table 3b show the modeled sound level at each monitoring location. The modeled sound level is well below the recorded ambient sound level at monitoring location M-1, M-2, M-3, and M-4 showing no potential impact. The modeled sound level at M-5 (66.7 dB(A)) is above the recorded ambient sound level of 34.7 dB(A). To measure how sound levels would affect the ambient sound level at M-5 the modeled sound level (Figure 4) at M-5 is input into the ambient data for that monitoring location. This was done ten times to model the effect of ten haul truck passes. No more than ten haul truck passes are anticipated per day. The modeled scenario at M-5 is compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

Table 3a: Tuesday, December 20, 2022, 40-ton Haul Truck Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	40-ton Haul Truck		
		Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	57.2	44	-	-
M-2	42.5	20	-	-
M-3	59.6	33	-	-
M-4	39.1	33	-	-
M-5	37.2	60	37.9	0.7

Table 3b: Wednesday, December 21, 2022, 40-ton Haul Truck Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	40-ton Haul Truck		
		Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	56.7	44	-	-
M-2	40.8	20	-	-
M-3	61.2	33	-	-
M-4	40.9	33	-	-
M-5	34.7	60	37.9	3.2

5.0 SUMMARY & CONCLUSIONS

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. Testing will only occur on weekdays, between the hours of 10:00 a.m. and 4:00 p.m. No more than two shots will be fired in one day. Forty-four residential receptors, and five parcels of NYS Land identified as Wild Forest fall within the Project Area (Figure 1). Sound level monitoring was conducted at five monitoring locations on December 20, 2022, and December 21, 2022, to determine ambient sound levels within the Project Area. Potential significant sources of sound associated with the project are the testing of the 155 mm howitzer and operation of 40-ton haul truck along the site access road to transport the 155 mm howitzer and monitoring equipment to the firing pad.

Two sound propagation models, with and without the Sound Mitigation Berm, were developed to evaluate the impulse sound level produced by the Sound Source (barrel of the M109, 155mm howitzer) within the Project Area (Figure 3 & 4). The effect of the modeled impulse sound level on ambient sound levels from each monitoring location is discussed in Section 4.2.1 and summarized in Table 2. An additional sound propagation model was developed to evaluate the sound levels produced by a 40-ton Haul Truck operating along the access road to the site. The effect of the modeled sound level on ambient sound levels from each monitoring location is discussed in Section 4.2.2 and summarized in Table 3.

The modeled sound level for the 40-ton Haul Truck operating along the access road to the site is well below the record ambient sound levels at M-1, M2, M3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 3). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 5) shows a modeled sound level of 60 dB(A), and a modeled ambient sound level of 37.9 dB(A) a 3.2 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

The modeled change in ambient sound level from two shots of the Sound Source (barrel of the M109, 155 howitzer) without the Sound Mitigation Berm is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 2). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 3) shows a modeled impulse sound

level of 107 dB(A) at M-5, and a modeled ambient sound level of 66.7 dB(A) a 32.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

In addition to the mitigative measures currently proposed (remote location of Site / natural topographic rise between Sound Source and Residential Receptors) UCI is proposing to construct a Sound Mitigation Berm. The modeled change in ambient sound level from two shots of the Sound Source (barrel of the M109, 155 howitzer) with the Sound Mitigation Berm is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identified residential receptors (Table 2). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 4) shows a modeled impulse sound level of 100 dB(A) at M-5, and a modeled ambient sound level of 59.7 dB(A) a 25.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022. The modeled impulse sound level at the property corner of the Wild Forest (R-45) parcel is 102 dB(A), and a modeled ambient sound level of 61.7 dB(A).

There are no structures identified, public trails on or means of public access to R-45. In reviewing surrounding land uses three currently permitted hard rock mining operations exist within a 2.1-mile radius of the Site. In addition, one of the currently permitted mining operations is adjacent to lands classified as Wilderness. Lands classified as Wilderness are less impacted by human use than lands classified as State Forest. Hard rock mining operations require regular blasting as part of their weekly operations, under the mines NYSDEC Mine Land Reclamation Permit an air blast limit of 133 dB measured to the closest structure outside the permit area is permitted. The closest Structure to the Firing pad is the Pulsifer residents (R-1) 5,200 ft. with a modeled impulse sound level implementing the Sound Mitigation Berm of 101 dB / 69 dB(A).

Based on the information presented in this report the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area.

FIGURES

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FIGURE 1 –SITE OVERVIEW MAP

428

FIGURE 1- SITE OVERVIEW MAP

615000 m

225000 m

N

2 miles

R-17 Gibson
R-18 Drummond
R-16 Williams
R-15 Ero
R-14 Bigelow
R-13 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-8 Marty
Hooper
R-1 Pulsifer
M-1
R-2 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-46 Wild Forest
R-45 Wild Forest
R-19 Bigelow
M-5
R-20 Colegrove
M-3
M-4
R-22 Mitchell
R-21 Laughin
R-47 Wild Forest
R-23 Mitchell
R-25 Ingram
R-24 Mitchell
610000 m
R-26 Salva
R-28
R-27 Smith
R-30 Ryan
R-48 Wild Forest
R-49 Wild Forest
R-31 Cassavaugh
R-33 OKusky
R-32 Ashline
R-34 Anderson
R-36 Huckins
R-38 Moore
R-37
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-44 Pulsifer
R-42 Pulsifer
M-2
R-43 Stevens

LEGEND

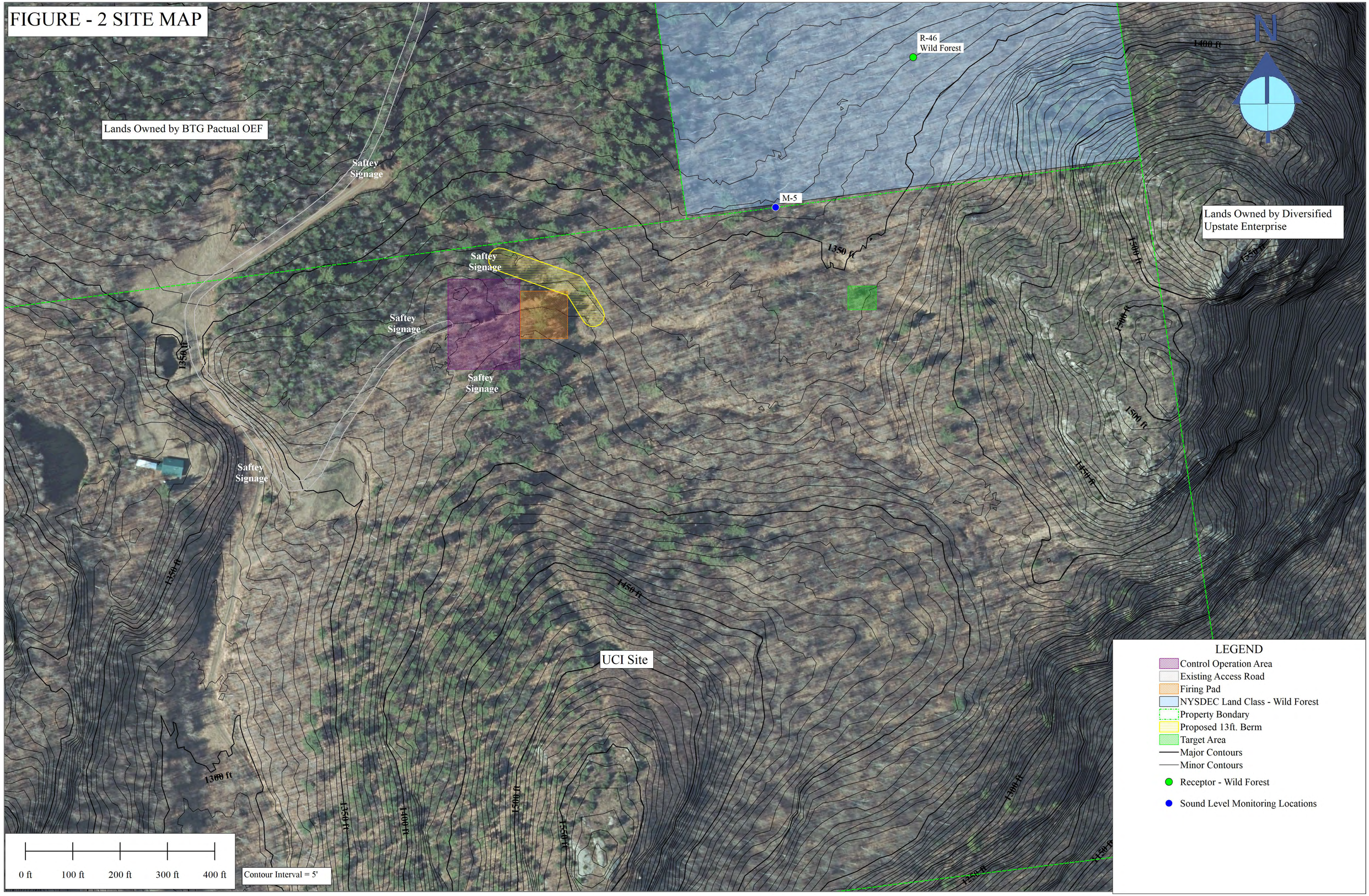
- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- Receptor - Wild Forest
- Residential Receptor
- Sound Level Monitoring Locations

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

FIGURE 2 – SITE MAP

430

FIGURE - 2 SITE MAP



431

FIGURE 3 – SOUND PROPAGATION MAP
NO SOUND MITIGATION BERM

432

FIGURE 3 - SOUND PROPOGATION MAP
NO SOUND MITIGATION BERM

225000 m

615000 m

615000 m

N

2 miles

R-17 Gibson
R-18 Drummond
R-16 Williams
R-15 Ero
R-14 Bigelow
R-13 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-8 Marty
Hooper
R-1 Pulsifer
M-1 75 dB(A)
R-2 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-46 Wild Forest
M-5 107dB(A)
Sound Source
R-45 Wild Forest
R-19 Bigelow
M-3 73 dB(A)
R-20 Colegrove
R-22 Mitchell
M-4 79 dB(A)
R-21 Laughin
R-47 Wild Forest
R-23 Mitchell
R-25 Ingram
R-24 Mitchell
R-26 Salva
R-28
R-27 Smith
R-30 Ryan
R-48 Wild Forest
R-49 Wild Forest
R-31 Cassavaugh
R-33 OKusky
R-32 Ashline
R-34 Anderson
R-36 Huckins
R-37
R-38 Moore
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-44 Pulsifer
R-42 Pulsifer
M-2 71 dB(A)
R-43 Stevens

610000 m

610000 m

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 45 DB(A) Sound Pressure Level
- 50 DB(A) Sound Pressure Level
- 55 DB(A) Sound Pressure Level
- 60 DB(A) Sound Pressure Level
- 65 DB(A) Sound Pressure Level
- 70 DB(A) Sound Pressure Level
- 75 DB(A) Sound Pressure Level
- 80 DB(A) Sound Pressure Level
- 85 DB(A) Sound Pressure Level
- 90 DB(A) Sound Pressure Level
- 95 DB(A) Sound Pressure Level
- 100 DB(A) Sound Pressure Level
- 105 DB(A) Sound Pressure Level
- 110 DB(A) Sound Pressure Level
- 115 DB(A) Sound Pressure Level
- 120 DB(A) Sound Pressure Level
- 125 DB(A) Sound Pressure Level
- 130 DB(A) Sound Pressure Level
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

225000 m

433

FIGURE 4 – SOUND PROPAGATION MAP
13FT. SOUND MITIGATION BERM INSTALLED

434

FIGURE 4 - SOUND PROPOGATION MAP
13FT. SOUND MITIGATION BERM INSTALLED

615000 m

225000 m

N

2 miles

R-17 Gibson
R-18 Drummond
R-16 Williams
R-15 Ero
R-14 Bigelow
R-13 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-8 Marty
Hooper
R-1 Pulsifer
R-2 Benway
M-1 67 dB(A)
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-46 Wild Forest
R-45 Wild Forest
M-5 100dB(A)
Sound Source
R-19 Bigelow
R-20 Colegrove
M-3 73 dB(A)
R-22 Mitchell
M-4 79 dB(A)
R-21 Laughin
R-47 Wild Forest
R-23 Mitchell
R-25 Ingram
R-24 Mitchell
R-26 Salva
R-28
R-27 Smith
R-30 Ryan
R-48 Wild Forest
R-49 Wild Forest
R-31 Cassavaugh
R-33 OKusky
R-32 Ashline
R-34 Anderson
R-36 Huckins
R-37
R-38 Moore
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-44 Pulsifer
R-42 Pulsifer
M-2 71 dB(A)
R-43 Stevens

610000 m

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 50 DB(A) Sound Pressure Level
- 55 DB(A) Sound Pressure Level
- 60 DB(A) Sound Pressure Level
- 65 DB(A) Sound Pressure Level
- 70 DB(A) Sound Pressure Level
- 75 DB(A) Sound Pressure Level
- 80 DB(A) Sound Pressure Level
- 85 DB(A) Sound Pressure Level
- 90 DB(A) Sound Pressure Level
- 95 DB(A) Sound Pressure Level
- 100 DB(A) Sound Pressure Level
- 105 DB(A) Sound Pressure Level
- 110 DB(A) Sound Pressure Level
- 115 DB(A) Sound Pressure Level
- 120 DB(A) Sound Pressure Level
- 125 DB(A) Sound Pressure Level
- 130 DB(A) Sound Pressure Level
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

435

225000 m

435

FIGURE 5 – SOUND PROPAGATION MAP
HAUL TRUCK

436

FIGURE 5 - SOUND PROPOGATION MAP
HAUL TRUCK

615000 m

225000 m

N

2 miles

R-17 Gibson
R-18 Drummond
R-16 Williams
R-15 Ero
R-14 Bigelow
R-13 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-8 Marty
Hooper
R-2 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-19 Bigelow
R-20 Colegrove
M-3 33 dB(A)
R-22 Mitchell
R-21 Laughin
R-23 Mitchell
R-24 Mitchell
R-25 Ingram
R-26 Salva
R-28
R-27 Smith
R-30 Ryan
R-31 Cassavaugh
R-33 OKusky
R-32 Ashline
R-34 Anderson
R-36 Huckins
R-38 Moore
R-37
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-42 Pulsifer
R-44 Pulsifer
M-2 20 dB(A)
R-43 Stevens

R-1 Pulsifer
M-1 44 dB(A)
Sound Source
access Road To Site
R-46 Wild Forest
R-45 Wild Forest
M-5 60 dB(A)
Sound Source
Sound Source
M-4 33 dB(A)
R-47 Wild Forest
R-48 Wild Forest
R-49 Wild Forest

610000 m

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 20 dB(A) Sound Pressure Level
- 25 dB(A) Sound Pressure Level
- 30 dB(A) Sound Pressure Level
- 35 dB(A) Sound Pressure Level
- 40 dB(A) Sound Pressure Level
- 45 dB(A) Sound Pressure Level
- 50 dB(A) Sound Pressure Level
- 55 dB(A) Sound Pressure Level
- 60 dB(A) Sound Pressure Level
- 65 dB(A) Sound Pressure Level
- 70 dB(A) Sound Pressure Level
- 75 dB(A) Sound Pressure Level
- 80 dB(A) Sound Pressure Level
- 85 dB(A) Sound Pressure Level
- acess road to site
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

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APPENDICES

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APPENDIX A –
NYSDEC – ASSESSING AND MITIGATING NOISE IMPACTS

439

Assessing and Mitigating Noise Impacts

New York State
Department of Environmental Conservation

PROGRAM POLICY	**Department ID: DEP-00-1**	**Program ID: n/a**
Issuing Authority: Environmental Conservation Law Articles 3, 8, 23, 27 Name: Jeffrey Sama Title: Director Signature: /S/ Date: 10/6/00 Issuance Date: October 6, 2000 Revised: February 2, 2001	**Originating Unit: Division of Environmental Permits** Office/Division: Environmental Permits Unit: Phone: (518) 402-9167 Latest Review Date (Office Use):	

Abstract: Facility operations regulated by the Department of Environmental Conservation located in close proximity to other land uses can produce sound that creates significant noise impacts for proximal sound receptors. This policy and guidance presents noise impact assessment methods, examines the circumstances under which sound creates significant noise impacts, and identifies avoidance and mitigative measures to reduce or eliminate noise impacts.

Related References: See references pages 27 and 28.

I. PURPOSE[1]

This policy is intended to provide direction to the staff of the Department of Environmental Conservation for the evaluation of sound levels and characteristics (such as pitch and duration) generated from proposed or existing facilities. This guidance also serves to identify when noise levels may cause a significant environmental impact and gives methods for noise impact assessment, avoidance, and reduction measures. These methods can serve as a reference to applicants preparing environmental assessments in support of an application for a permit. Additionally, this guidance explains the Department's regulatory authority for undertaking noise evaluations and for imposing conditions for noise mitigation measures in the agency's approval

[1] A Program Policy Memorandum is designed to provide guidance and clarify program issues for Division staff to ensure compliance with statutory and regulatory requirements. It provides assistance to New York State Department of Environmental Conservation (DEC) staff and the regulated community in interpreting and applying regulations and statutes to assure that program uniformity is attained throughout the State. Nothing set forth in a Program Policy Memorandum prevents DEC staff from varying from that guidance as specific circumstances may dictate, provided the staff's actions comply with applicable statutory and regulatory requirements. As this guidance document is not a fixed rule, it does not create any enforceable right by any party using the Program Policy Memorandum.

of permits for various types of facilities pursuant to regulatory program regulations and the State Environmental Quality Review Act (SEQR).

II. BACKGROUND

Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by proposed or existing facilities may become noise due to land use surrounding the facility. When lands adjoining an existing or proposed facility contain residential, commercial, institutional or recreational uses that are proximal to the facility, noise is likely to be a matter of concern to residents or users of adjacent lands.

A. Sources of Noise Generation

The three major categories of noise sources associated with facilities are (1) fixed equipment or process operations; (2) mobile equipment or process operations; and (3) transport movements of products, raw material or waste. The fixed plant may include a very wide range of equipment including: generators; pumps; compressors; crushers of plastics, stone or metal; grinders; screens; conveyers; storage bins; or electrical equipment. Mobile operations may include: drilling; haulage; pug mills; mobile treatment units; and service operations. Transport movements may include truck traffic within the operation, loading and unloading trucks and movement in and out of the facility. Any or all of these activities may be in operation at any one time. Singular or multiple effects of sound generation from these operations may constitute a potential source of noise.

B. Potential for Adverse Impacts

Numerous environmental factors determine the level or perceptibility of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; time of day; wind direction; temperature gradient; and relative humidity. The characteristics of a sound are also

important determining factors for considering it as noise. The amplitude (loudness), frequency (pitch), impulse patterns and duration of sound all affect the potential for a sound to be a noise. The combination of sound characteristics, environmental factors and the physical and mental sensitivity of a receptor to a sound determine whether or not a sound will be perceived as a noise. This guidance uses these factors in assessing the presence of noise and the significance of its impacts. It relies upon qualitative and quantitative sound evaluation techniques and sound pressure level impact modeling presented in accepted references on the subject.

C. Mitigation

Mitigation refers to actions that will be taken to reduce the effects of noise or the noise levels on a receptor. Adverse noise effects generated by a facility can be avoided or reduced at the point of generation thereby diminishing the effects of the noise at the point of reception. This guidance identifies various mitigation techniques and their proper application either at the source of noise generation or on a facility's property. Alternative construction or operational methods, equipment maintenance, selection of alternative equipment, physical barriers, siting of activities, set backs, and established hours of construction or operation, are among the techniques that can successfully avoid or reduce adverse noise effects.

D. Decision Making

When an assessment of the potential for adverse noise impacts indicates the need for noise mitigation, it is preferred that specifications for such measures be incorporated in a noise analysis and in the applicant's work or operational plan necessary for a complete application. Presenting a plan that incorporates effective noise mitigation provisions facilitates the Department's technical and environmental review and minimizes or negates the imposition of permit conditions by the Department. Adherence to these plans becomes a condition of a permit.

Noise avoidance and mitigation measures may also be imposed directly as conditions of permit issuance. This guidance will review the statutory authority under which the Department can require the mitigation of noise effects.

III. POLICY

In the review of an application for a permit, the Department of Environmental Conservation is to evaluate the potential for adverse impacts of sound generated and emanating to receptors outside of the facility or property. When a sound level evaluation indicates that receptors may experience sound levels or characteristics that produce significant noise impacts or impairment of property use, the Department is to require the permittee or applicant to employ reasonable and necessary measures to either eliminate or mitigate adverse noise effects. Options to be used to fulfill this guidance should be implemented within the existing regulatory and environmental review framework of the agency.

Regulatory authority for assessing and controlling noise effects are contained in both SEQR and specific Department program regulations. Specific regulatory references are as follows:

Section 3-0301(1)(i) of the Environmental Conservation Law (ECL) states that the commissioner shall have the power to: "i. Provide for prevention and abatement of all water, land and air pollution including but not limited to that related to particulates, gases, dust, vapors, noise, radiation, odor, nutrients and heated liquids."

To comply with Article 8 of the ECL and 6 NYCRR Part 617, State Environmental Quality Review Act, consideration of all relevant environmental issues must be undertaken in making a determination of environmental significance. Noise impact potential is one of many potential issues for consideration in a SEQR review.

Environmental Conservation Law (ECL) Article 23, Title 27, Mined Land Reclamation Law (MLRL), requires applicants for permits to prepare and submit a mined land use plan to the Department for approval. The plan must describe, "the applicant's mining method and measures

to be taken to minimize adverse environmental impacts resulting from the mining operation." The provisions to be incorporated in a Mined Land Use Plan, as specified in 6 NYCRR Section 422.2, include the control of noise as a component of the plan.

The solid waste regulations at 6 NYCRR Subdivision 360-1.14(p), establish A-weighted decibel levels that are not to be exceeded at the property line of a facility.

The Division of Air Resources has regulations in 6 NYCRR Parts 450 through 454 that regulate the allowable sound level limits on certain motor vehicles. The statutory authority for these regulations is found in the New York State Vehicle and Traffic Law, Article 10, Section 386.

This guidance does not supercede any local noise ordinances or regulations.

IV. RESPONSIBILITY

The environmental analyst, acting as project manager for the review of applications for permits or permit modifications and working in concert with the program specialist, is responsible for ensuring that sound generation and noise emanating from proposed or existing facilities are properly evaluated. For new permits or significantly modified permits, there should be a determination as to the potential for noise impacts, and establishment of the requirements for noise impact assessment to be included in the application for permit. Where the Department is lead agency, the analyst is responsible for making a determination of significance pursuant to SEQR with respect to potential noise impacts and include documentation for such determination.

Where impacts are to be avoided or reduced through mitigation measures, the analyst, or where there are program requirements to address noise, the program specialist, should determine the effectiveness and feasibility of those measures and ensure that the permit conditions contain specific details for such measures. It should also be determined if additional measures to control noise are to be imposed as a condition of permitting. Appropriate permit language for the permit conditions should be developed by the program specialist and the analyst. The results of noise impact evaluations and the effectiveness of mitigation measures

shall be incorporated into SEQR documents and, where necessary, permit conditions shall be placed in final permits to ensure effective noise control.

When it is determined that potential noise effects, as well as other issues, warrant evaluation of impacts and mitigation measures in a Draft Environmental Impact Statement (EIS) prepared pursuant to SEQR, the environmental analyst with the Division of Environmental Permits assumes responsibility for determining the level of evaluation needed to assess sound level generation, noise effects, and mitigation needs and feasibility.

For existing facilities, the program specialist will determine the need for additional mitigation measures to control noise effects either in response to complaints or other changes in circumstances such as new noise from existing facilities or a change in land-use proximal to the facility.

The applicant or their agent, in preparing an application for a permit and supporting documentation, is responsible for assessing the potential noise impacts on area receptors. When potential adverse noise impacts are identified, the applicant should incorporate noise avoidance and reduction measures in the construction or operating plans. The applicant's submittal should also assess the effectiveness of proposed mitigation measures in eliminating adverse noise reception. Where noise effects are determined to be a reason in support of a SEQR positive declaration, the applicant shall assess noise impacts, avoidance, and mitigation measures in a Draft EIS using methodologies acceptable to this Department.

V. PROCEDURE

The intent of this section is to: introduce terms related to noise analyses; describe some of the various methods used to determine the impacts of sound pressure levels on receptors; identify some of the various attenuators of noise; and list some of the mitigative techniques that can be used to reduce the effects of noise on a receptor. At the end of the section three levels of analysis are described. The first level determines the potential for adverse noise impacts based on noise characteristics and sound pressure increases solely on noise attenuation over distance between the source and receptor of the noise. The second level factors other considerations such as topography and noise abatement measures in determining if adverse

noise impacts will occur. The third level evaluates noise abatement alternatives and their effectiveness in avoiding or reducing noise impacts.

The environmental effects of sound and human perceptions of sound can be described in terms of four characteristics:

1. Sound Pressure Level (SPL may also be designated by the symbol L_p) or perceived loudness is expressed in decibels (dB) or A-weighted decibel scale dB(A) which is weighted towards those portions of the frequency spectrum, between 20 and 20,000 Hertz, to which the human ear is most sensitive. Both measure sound pressure in the atmosphere.

2. Frequency (perceived as pitch), the rate at which a sound source vibrates or makes the air vibrate.

3. Duration i.e., recurring fluctuation in sound pressure or tone at an interval; sharp or startling noise at recurring interval; the temporal nature (continuous vs. intermittent) of sound.

4. Pure tone which is comprised of a single frequency. Pure tones are relatively rare in nature but, if they do occur, they can be extremely annoying.

Another term, related to the average of the sound energy over time, is the Equivalent Sound Level or $L_{eq.}$ The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent Sound Level is considered to be directly related to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time. By its derivation L_{eq} does not express the maximum nor minimum SPLs that may occur in a given time period. These maximum and minimum SPLs should be given in the noise analysis. The time interval over which the L_{eq} is measured should always be given. It is generally shown as a parenthetic; $L_{eq\,(8)}$ would indicate that the sound had been measured for a period of eight hours.

Equivalent Sound Level (L_{eq}) correlates well and can be combined with other types of noise analyses such as Composite Noise Rating, Community Noise Equivalent Level and day-night noise levels characterized by L_{dn} where an $L_{eq(24)}$ is measured and 10 dBA is added to all noise levels measured between 10 pm and 7 am. These different types of noise analyses

basically combine noise measurements into measures of cumulative noise exposure and may weight noise occurring at different times by adding decibels to the actual decibel level. Some of these analyses require more complex noise analysis than is mentioned in this guidance. They may be used in a noise analyses prepared for projects.

Designations for sound levels may also be shown as $L_{(10)}$ or $L_{(90)}$ in a noise analysis. These designations refer to the sound pressure level (SPL) that is exceeded for 10% of the time over which the sound is measured, in the case of $L_{(10)}$, and 90% of the time, in the case of $L_{(90)}$. For example, an $L_{(90)}$ of 70 dB(A) means that 70 dB(A) is exceeded for 90% the time for which the measurement was taken.

A. Environmental Setting and Effects on Noise Levels

1. Sound Level Reduction Over Distance - It is important to have an understanding of the way noise decreases with distance. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, SPL changes in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dB reduction in the sound. Therefore, a sound level of 70 dB at 50 feet would have a sound level of approximately 64 dB at 100 feet. At 200 feet sound from the same source would be perceived at a level of approximately 58 dB.

2. Additive Effects of Multiple Sound Sources - The total sound pressure created by multiple sound sources does not create a mathematical additive effect. Below Table A is given to assist you in calculating combined noise sources. For instance, two proximal noise sources that are 70 dBA each do not have a combined noise level of 140 dBA. In this case the combined noise level is 73 dBA. Since the difference between the two sound levels is 0 dB, Table A tells us to add 3 dB to the sound level to compensate for the additive effects of the sound. To find the cumulative SPL assess the SPLs starting with the two lowest readings and work up to the difference between the two highest readings. For several pieces of equipment, operating at one

time, calculate the difference first between the two lowest SPLs, check Table A and add the appropriate number of decibels to the higher of the two sound levels. Next, take the sound level that was calculated using Table A and subtract the next lowest sound level to be considered for the operation. Consult Table A again for the additive effect and add this to the higher of the two sound levels. Follow this process until all the sound levels are accounted for. As an example, let us say that an area for a new facility is being cleared. The equipment to be used is: two chainsaws, one operating at 57 dBA and one at 60 dBA; a front end loader at 80 dBA; and a truck at 78 dBA. Start with the two lowest sound levels: 60 dBA - 57 dBA = 3 dBA difference. Consulting the chart add 2 dBA to the higher sound level. The cumulative SPL of the two chainsaws is 62 dBA. Next, subtract 62 dBA from 78 dBA. 78 dBA - 62 dBA = 16 dBA. In this case, 0 dBA is added to the higher level so we end up with 78 dBA. Lastly, subtract 78 dBA from the 80 dBA. 80 dBA - 78 dBA = 2 dBA a difference of 2 dBA adds 2 dBA to the higher SPL or 82 dBA. The SPL from these four pieces of equipment operating simultaneously is 82 dBA.

Table A

Approximate Addition of Sound Levels

Difference Between Two Sound Levels	Add to the Higher of the Two Sound Levels
1 dB or less	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0 dB

(USEPA, Protective Noise Levels, 1978)

3. Temperature and Humidity - Sound energy is absorbed in the air as a function of temperature, humidity and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. Such attenuation is short term and, since it occurs over a great distance, should not be considered in calculations. Higher temperatures tend to increase sound velocity but does

not have an effect on the SPL. Sound waves bend towards cooler temperatures. Temperature inversions may cause temporary problems when cooler air is next to the earth allowing for more distant propagation of sound. Similarly, sound waves will bend towards water when it is cooler than the air and bounce along the highly reflective surface. Consequently large water bodies between the sound source and the receptor may affect noise attenuation over distance.

4. Time of Year - Summer time noises have the greatest potential for causing annoyance because of open windows, outside activities, etc. During the winter people tend to spend more time indoors and have the windows closed. In general, building walls and windows that are closed provide a 15 dB reduction in noise levels. Building walls with the windows open allow for only a 5 dB reduction in SPL.

5. Wind - Wind can further reduce the sound heard at a distance if the receptor is upwind of the sound. The action of the wind disperses the sound waves reducing the SPLs upwind. While it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experienced at the same distance without a wind. This dispels the common belief that sound levels are increased downwind due to wind carrying noise.

6. Land forms and structures - In certain circumstances, sound levels can be accentuated or focused by certain features to cause adverse noise impacts at specified locations. At a hard rock mine, curved quarry walls may have the potential to cause an amphitheater effect while straight cliffs and quarry walls may cause an echo. Buildings that line streets in cities can cause a canyon effect where sound can be reflected from the building surfaces similar to what might happen in a canyon. Consideration of noise impacts associated with these types of conditions may require specialized expertise to evaluate impact potential and to formulate suitable mitigation techniques.

Consideration of existing noise sources and sound receptors in proximity to a proposed activity can be important considerations even when the activity under review is not a noise source. Topography, vegetation, structures and the relative location of noise receptors and sources to these features are all aspects of the environmental setting that can influence noise impact potential. As such, land alteration may also indirectly create an adverse noise impact where natural land features or manmade features serve as a noise barrier or provide noise attenuation for existing sources of noise, i.e. highway, railroads, manufacturing activity. Removal of these features, i.e. hills, vegetation, large structures or walls, can expose receptors to increased sound pressure levels causing noise problems where none had previously existed.

B. Impact Assessment

1. Factors to Consider

Factors to consider in determining the impact of noise on humans, are as follows:

a. Evaluation of Sound Characteristics

(1) Ambient noise level - A noise can only intrude if it differs in character or SPL from the normal ambient sound. Most objective attempts to assess nuisance noise adopt the technique of comparing the noise with actual ambient sound levels or with some derived criterion.

(2) Future noise level - The ambient noise level plus the noise level from the new or proposed source.

(3) Increase In Sound Pressure Level - A significant factor in determining the annoyance of a noise is Sound Pressure Level (SPL). SPLs are measured in decibels.

(4) Sharp and Startling Noise - These high frequency and high intensity noises can be extremely annoying. When initially evaluating the effects

of noise from an operation, pay particular attention to noises that can be particularly annoying. One such noise is the back-up beepers required to be used on machinery. They definitely catch one's attention as they were meant to do. Continual beeping by machinery can be mitigated (see Section V.C. Mitigation - Best Management Practices). Another impulse noise source that can be very annoying is the exhaust from compressed air machinery. This exhaust is usually released in loud bursts. Compressed air exhaust can also be mitigated if it causes a noise problem by using readily available mufflers or specifically designed enclosures.

(5) Frequency and Tone - Frequency is the rate at which a sound source vibrates or makes the air vibrate. Frequency is measured in Hertz (Hz). Frequency can also be classified as high ("sharp"), low ("dull"), and moderate. Pure tones are rare in nature. Tonal sounds usually consist of pure tones at several frequencies. Pure tones and tonal sounds are discerned more readily by the human ear. Pure tones and tonal sounds are compensated for in sound studies by adding a calculated number of dB(A) to the measured sound pressure.

(6) Percentile of Sound Levels - Fluctuations of SPLs can be expressed as a percentile level designated as $L_{(n)}$ where a given decibel level is exceeded *n* % of the time. A designation of $L_{(10)}$ = 70 dBA means the measured SPLs exceeded 70 dBA 10% of the time. A designation of $L_{(90)}$ = 70 dBA means the measured SPLs were exceeded 90% of the time. $L_{(90)}$ is often used to designate the background noise level.

(7) Expression of Overall Sound - Part of the overall assessment of sound is the *Equivalent Sound Level* (L_{eq}) which assigns a single value of sound level for a period of time in which varying levels of sound are experienced over that time period. The L_{eq} value provides an indication of the effects of sound on people. It is also useful in establishing the ambient sound levels at a potential noise source.

In order to evaluate the above factors in the appropriate context, one must identify the following: 1) appropriate receptor locations for sound level calculation or measurement; 2) ambient sound levels and characteristics at these receptor locations; and 3) the sound pressure increase and characteristics of the sound that represents a significant noise effect at a receptor location.

b. Receptor Locations

Appropriate receptor locations may be either at the property line of the parcel on which the facility is located or at the location of use or inhabitance on adjacent property. The solid waste regulations require the measurements of sound levels be at the property line. The most conservative approach utilizes the property line. The property line should be the point of reference when adjacent land use is proximal to the property line. Reference points at other locations on adjacent properties can be chosen after determining that existing property usage between the property line and the reference point would not be impaired by noise, i.e., property uses are relatively remote from the property line. The location of the facility should be shown on a map in relation to each potential receptor. Any future expansion should be described in a narrative as well as depicted on a map. The map and narrative should also include the distance of the operation to each point of reception including the distance at the point in time when an expanding operation will be closest to the receptors.

c. Thresholds for Significant Sound Pressure Level (SPL) Increase

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on

existing SPLs and the character of surrounding land use and receptors. SPL increases approaching 10 dB result in a perceived doubling of SPL. The perceived doubling of the SPL results from the fact that SPLs are measured on a logarithmic scale. An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases. The above thresholds as indicators of impact potential should be viewed as guidelines subject to adjustment as appropriate for the specific circumstances one encounters.

Establishing a maximum SPL at the point of reception can be an appropriate approach to addressing potential adverse noise impacts. Noise thresholds are established for solid waste management facilities in the Department's Solid Waste regulations, 6 NYCRR Part 360. Most humans find a sound level of 60 - 70 dB(A) as beginning to create a condition of significant noise effect (EPA 550/9-79-100, November 1978). In general, the EPA's "Protective Noise Levels" guidance found that ambient noise levels # 55 dBA $L_{(dn)}$ was sufficient to protect public health and welfare and, in most cases, did not create an annoyance (EPA 550/9-79-100, November 1978). In non-industrial settings the SPL should probably not exceed ambient noise by more than 6 dB(A) at the receptor. An increase of 6 dB(A) may cause complaints. There may be occasions where an increase in SPLs of greater than 6 dB(A) might be acceptable. The addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dB(A). This would be considered the "upper end" limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet. Some outdoor activities can be conducted at a SPL of 65 dB(A). Still lower ambient noise levels may be necessary if there are sensitive receptors nearby. These goals can be attained by using the mitigative techniques outlined in this guidance.

Ambient noise SPLs in industrial or commercial areas may exceed 65 dB(A) with a high end of approximately 79 dB(A) (EPA 550/9-79-100, November 1979). In these instances mitigative measures utilizing best management practices should be used in an effort to ensure that a facility's generated sound levels are at a minimum. The goal in an industrial/commercial area, where ambient SPLs are already at a high level, should be not to exceed the ambient SPL. Remember, if a new source

operates at the same noise level as the ambient, then 3 dB(A) must be added to the existing ambient noise level to obtain the future noise level. If the goal is not to raise the future noise levels the new facility would have to operate at 10 dB(A) or more lower than the ambient.(see Table A)

Table B

HUMAN REACTION TO INCREASES IN SOUND PRESSURE LEVEL

Increase in Sound Pressure (dB)	Human Reaction
Under 5	Unnoticed to tolerable
5 - 10	Intrusive
10 - 15	Very noticeable
15 - 20	Objectionable
Over 20	Very objectionable to intolerable

(Down and Stocks - 1978)

Impact assessment will vary for specific project reviews, but must consist of certain basic components for all assessments. Additional examination of sound generation and noise reception are necessary, where circumstances warrant. Sound impact evaluation is an incremental process, with four potential outcomes:

- exemption criteria are met and no noise evaluation is required;
- noise impacts are determined to be non-significant (after first-level evaluation);
- noise impacts are identified as a potential issue but can be readily mitigated (after second level evaluation); or
- noise impacts are identified as a significant issue requiring analysis of alternatives as well as mitigation (third level evaluation).

All levels of evaluation may require preparation of a noise analysis. The required scope of noise impact analysis can be rudimentary to rather sophisticated, depending on circumstances and the results obtained from initial levels of evaluation. Recommendations for each level of evaluation are presented below.

2. Situations in Which No Noise Evaluation is Necessary

When certain criteria are satisfied, the need for undertaking a noise impact analysis at any level is eliminated. These criteria are as follows:

a. The site is contained within an area in which local zoning provides for the intended use as a "right of use". It does not apply to activities that are permissible only after an applicant is granted a special use permit by the local government; and

b. The applicant's operational plan incorporates appropriate best management practices (BMPs [see Section V.C. Mitigation - Best Management Practices]) for noise control for all facets of the operation.

Where activities may be undertaken as a "right of use", it is presumed that noise has been addressed in establishing the zoning. Any residual noise that is present following BMP implementation should be considered an inherent component of the activity that has been found acceptable in consideration of the zoning designation of the site.

3. First Level Noise Impact Evaluation

The initial evaluation for most facilities should determine the maximum amount of sound created at a single point in time by multiple activities for the proposed project. All facets of the construction and operation that produce noise should be included such as land clearing activities (chain saw and equipment operation), drilling, equipment operation for excavating, hauling or conveying materials, pile driving, steel work, material processing, product storage and removal. Land clearing and construction may be only temporary noise at the site whereas the ongoing operation of a facility would be considered permanent noise. An analysis may be required for

various phases of the construction and operation of the project to assure that adverse noise effects do not occur at any phase.

To calculate the sound generated by equipment operation, one can consult the manufacturers' specifications for sound generation, available for various types of equipment. Another option for calculating the sound to be generated by equipment is to make actual measurements of sound generated by existing similar equipment, elsewhere.

Tables C and D summarize noise measurements from some common equipment used in construction and mining. Table E summarizes the noise level, in decibels (dB[A]), from some common sources. This information can be used to assist Department staff in relating potential noise impacts to sound levels produced by commercial and industrial activities. Use of these tables in the first level of analysis will help determine whether or not noise will be an issue and whether actual measurements should be made to confirm noise levels.

Table C

PROJECTED NOISE LEVELS

Noise Source	Measurements	1,000 feet	2,000 feet	3,000 feet
Primary and secondary crusher	89 dB(A) at 100 ft	69.0 dB(A)	63.0 dB(A)	59.5 dB(A)
Hitachi 501 shovel loading	92 dB(A) at 50 ft	66.0 dB(A)	60.0 dB(A)	56.5 dB(A)
Euclid R-50 pit truck loaded	90 dB(A) at 50 ft	64.0 dB(A)	58.0 dB(A)	54.4 dB(A)
Caterpillar 988 loader	80 dB(A) at 300 ft	69.5 dB(A)	63.5 dB(A)	60.0 dB(A)

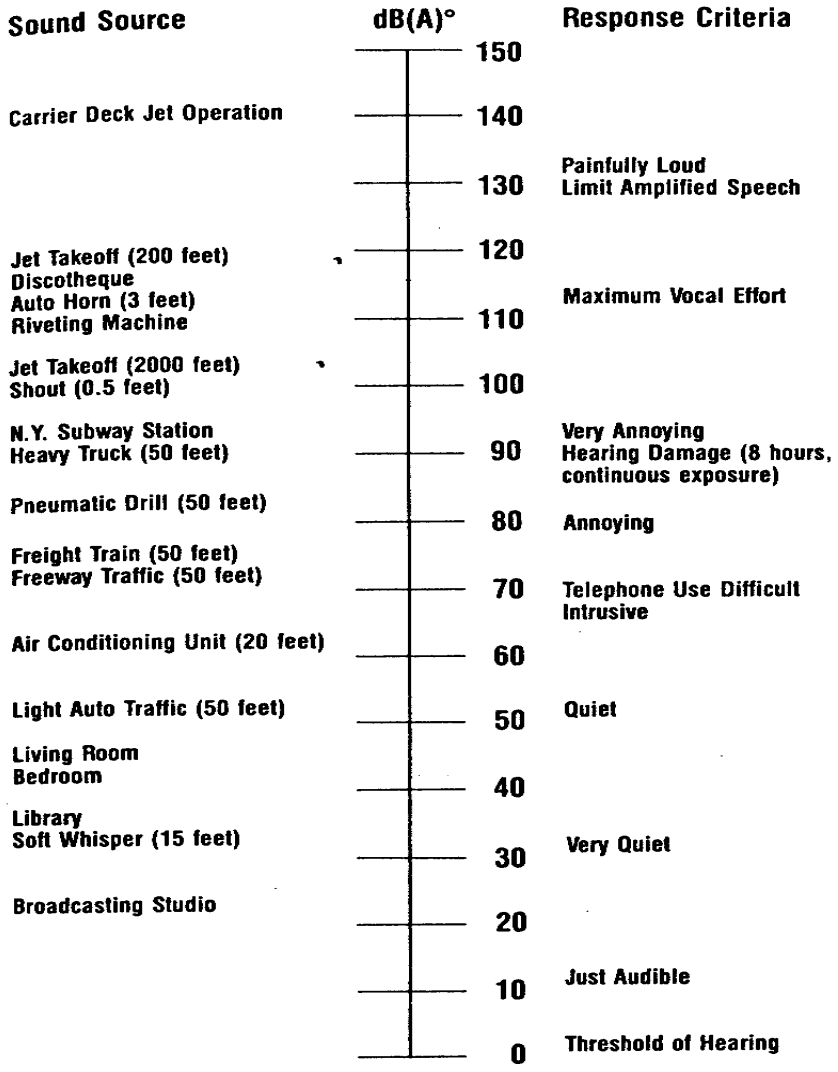
(The Aggregate Handbook, 1991)

Table D
Common Equipment Sound Levels

EQUIPMENT	**DECIBEL LEVEL**	**DISTANCE** in feet
Augered earth drill	80	50
Backhoe	83-86	50
Cement mixer	63-71	50
Chain saw cutting trees	75-81	50
Compressor	67	50
Garbage Truck	71-83	50
Jackhammer	82	50
Paving breaker	82	50
Wood Chipper	89	50
Bulldozer	80	50
Grader	85	50
Truck	91	50
Generator	78	50
Rock drill	98	50

(excerpt and derived from Cowan, 1994)

Table E



(The Aggregate Handbook, 1991)

The sound level at receptor locations should be calculated using the inverse square rule whereby sound is attenuated over distance. Again, each doubling of the distance from the source of a noise decreases the SPL by 6 dB(A) at distances greater than 50 feet. This calculation should first consider the straight line distance between the point of noise generation and the point of noise reception with the presumption that no natural or manmade features exist along the transect between the two points that would further attenuate sound level. Calculations should be performed for each point of reception in all directions being careful to evaluate the worst case noise impact potential by considering activities at the point where they would be closest to a receptor. The sound level calculated for the point of reception should be related to ambient sound levels. Ambient sound levels can be either measured or assumed based on established references for the environmental setting and land use at the point of reception. For estimation purposes, ambient SPLs will vary from approximately 35 dB(A) in a wilderness area to approximately 87 dB(A) in a highly industrial setting. A quiet seemingly serene setting such as rural farm land will be at the lower end of the scale at about 45 dB(A), whereas an urban industrial area will be at the high end of this scale at around 79 dB(A) (EPA 550/9-79-100, November 1978). If there is any concern that levels based on reference values do not accurately reflect ambient SPL, field measurements should be undertaken to determine ambient SPLs.

Where this evaluation indicates that sound levels at the point of reception will not be perceptible, similar to or only slightly elevated as compared to ambient conditions, no further evaluation is required. When there is an indication from this initial analysis that marginal or significant noise impact may occur, further evaluation is required. In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive. (see B.1.a Evaluation of Sound Characteristics)

4. Second Level Noise Impact Evaluation

Further refine the evaluation of noise impact potential by factoring in any additional noise attenuation that will be provided by existing natural topography, fabricated structures such as buildings, walls or berms or vegetation located between the point of noise generation and noise reception. This analysis may require consideration of future conditions and the loss of natural noise buffers over time.

Dense vegetation that is at least 100 feet in depth will reduce the sound levels by 3 to 7 dB(A). Evergreens provide a better vegetative screen than deciduous trees. Keep in mind that if a vegetative screen does not currently exist, planting a vegetative screen may require 15 or more years of growth before it becomes effective.

The degree to which topography attenuates noise depends on how close the feature is located to the source or the receptor of the noise. Topography can act as a natural screen. The closer a hill or other barrier is to the noise source or the receptor, the larger the sound shadow will be on the side opposite the noise source. Certain operations such as mining and landfills may be able to use topography to maintain a screen between the operation and receptors as they progress. Mining operations may be able to create screens by opening a mine in the center of the site using and maintaining the pit walls as barriers against sound (Aggregate Handbook, 1991).

If after taking into account all the attenuating features the potential still exists for adverse noise impact, other types of noise analyses or modeling should be used to characterize the source. An Equivalent Sound Level (L_{eq}) analysis or a related type of noise analysis may better define activities or sources that require more mitigation or isolation so that noise emanating from these sources will not cause an adverse impact.

Where it is demonstrated that noise absorbing or deflecting features further attenuate sound reception to a level of no significant increase, no further analysis is necessary. Where it is determined that noise level or the character of the noise may

have a significant adverse effect on receptors, other noise mitigation measures should be evaluated in an expanded noise analysis.

5. Third Level - Mitigation Measures

When the above analyses indicate significant noise effects may or will occur, the applicant should evaluate options for implementation of mitigation measures that avoid, or diminish significant noise effects to acceptable levels (see Section V.C. Mitigation - Best Management Practices). Adequate details concerning mitigation measures and an evaluation of the effectiveness of the mitigative measures through additional sound level calculations should be provided in a noise analysis. These calculations are to factor in the noise reduction or avoidance capabilities of the mitigation measures. In circumstances where noise effects cannot readily be reduced to a level of no significance by project design or operational features in the application, the applicant must evaluate alternatives and mitigation measures in an environmental impact statement to avoid or reduce impacts to the maximum extent practicable per the requirements of the State Environmental Quality Review Act (SEQR).

The noise analysis should be part of the application or a supplement to it, and will be part of the SEQR environmental assessment by reference. Duplicative noise analysis information is not required for the permit application and the assessment of impacts under SEQR. A proper analysis can satisfy information needs for both purposes.

C. Mitigation - Best Management Practices (BMP) for Reducing Noise

Various noise abatement techniques are available for reducing frequency of sound, duration of sound or SPLs at receptor locations. The mitigation techniques given below are listed according to what sound characteristic they mitigate.

1. Reduce noise frequency and impulse noise at the source of generation by:

   a. Replacing back-up beepers on machinery with strobe lights (subject to other requirements, e.g., OSHA and Mine Safety and Health Administration, as applicable). This eliminates the most annoying impulse beeping;

   b. Using appropriate mufflers to reduce the frequency of sound on machinery that pulses, such as diesel engines and compressed air machinery;

   c. Changing equipment: using electric motors instead of compressed air driven machinery; using low speed fans in place of high speed fans;

   d. Modifying machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces; and

2. Reduce noise duration by:

   a. Limiting the number of days of operation, restricting the hours of operation and specifying the time of day and hours of access and egress can abate noise impacts.

   b. Limiting noisier operations to normal work day hours may reduce or eliminate complaints.

Limiting hours of construction or operation can be an effective tool in reducing potential adverse impacts of noise. The impacts of noise on receptors can be

significantly reduced by effectively managing the hours at which the loudest of the operations can take place.

Implementation of hours of operation does not reduce the SPL emanating from a facility. Determining whether or not hours of operation will be effective, mitigation requires consideration of: public safety, for example road construction at night may reduce traffic concerns and facilitate work; duration of the activity, is it a one time event necessary to meet a short term goal or will the activity become an ongoing operation; and surrounding land use, consider what type(s) of land use is proximal to the activity and at what time(s) might a reduction of noise levels be necessary. There may be other factors to consider due to the uniqueness of a given activity or the type of land use adjacent to the activity. Hours of operation should also consider weekend activities and legal holidays that may change the types of land use adjacent to the permitted activity or increase traffic levels in an area.

The best results from using hours of operation as a mitigative measure will be obtained if the hours are negotiated with the owner or operator of the facility. The less noisy aspects of an operation may not have to be subject to the requirements of hours of operation such as preparing, greasing and maintaining machinery for the upcoming day's operation. The more noisy operations can be scheduled to begin when people in the receptor area are less likely to be adversely effected. Hours of operation should be included in the operation plans for a facility that becomes part of the permit, or in the event that there is no operation plan, can be included as a permit condition.

3. Reduce Noise sound pressure levels by:

   a. Increasing the setback distance.
   b. Moving processing equipment during operation further from receptors.
   c. Substituting quieter equipment (example - replacing compressed air fan with an electric fan could result in a 20 dB reduction of noise level).

d. Using mufflers selected to match the type of equipment and air or gas flow on mechanical equipment.
e. Ensuring that equipment is regularly maintained.
f. Enclosing processing equipment in buildings (example - enclosing noisy equipment could result in an 8-10 dB noise level reduction, a 9 inch brick wall can reduce SPL by 45-50 dB).
g. Erecting sound barriers such as screens or berms around the noise generating equipment or near the point of reception. The angle of deflection also increases as the height of a screen or barrier increases. Screens or barriers should be located as close to the noise source or the receptor as possible. The closer the barrier is located to the source or the receptor, the greater the angle of deflection of the sound waves will be creating a larger "sound shadow" on the side opposite the barrier. Stockpiles of raw material or finished product can be an effective sound barrier if strategically placed.
h. phasing operations to preserve natural barriers as long as possible.
i. altering the direction, size, proximity of expanding operations.
j. Designing enclosed facilities to prevent or minimize an SPL increases above ambient levels. This would require a noise analysis and building designed by a qualified engineer that includes adequate ventilation with noise abatement systems on the ventilation system.

Public notification of upcoming loud events can also be used as a form of mitigation although it doesn't fit easily into the categories above. People are less likely to get upset if they know of an upcoming event and know that it will be temporary.

The applicant should demonstrate that the specific mitigation measures proposed will be effective in preventing adverse noise effects on receptors.

D. Decision Making - Conditioning Permits to Limit Noise Impacts

Preferably, the mitigation measures as outlined in the construction and operational plans should be relied upon to mitigate the effects of noise on receptors. The permit should state that the activity will be conducted in accordance with the approved plan. Otherwise, mitigation measures and BMP's can be imposed within specific permit conditions.

It is not the intention of this guidance to require decibel limits to be established for operations where such limits are not required by regulation. There are, however, instances when a decibel limit may be established for an operation to ensure activities do not create unacceptable noise effects, as follows:

1. The review of a draft and final environmental impact statement demonstrates the need for imposition of a decibel limit;
2. A decibel limit is established by the Commissioner's findings after a public hearing has been held on an application;
3. The applicant asks to have a decibel limit to demonstrate the ability to comply; or
4. A program division seeks to establish a decibel limit as a permit condition, when necessary to demonstrate avoidance of unacceptable noise impact.

Ultimately, the final decision must incorporate appropriate measures to minimize or avoid significant noise impacts, as required under SEQR. Any unavoidable adverse effects must be weighed along with other social and economic considerations in deciding whether to approve or deny a permit.

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APPENDIX B -
INSTRUMENT CALIBRATION SHEETS

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INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 5392
Description Quest QC-10 Acoustic Calibrator
Calibrated 5/26/2022

Manufacturer Quest
Model Number QC-10
Serial Number QID050172
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 35

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

CASELLA

Certificate of Conformity and Calibration FA05190

Instrument Type:-	**CEL-633C**
Serial Number	4210504
Firmware revision	V006-05
Microphone Type:-	**CEL-251**
Serial Number	05084
Preamplifier Type:-	**CEL-495**
Serial Number	005056
Instrument Class/Type:-	1



Applicable standards:-

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- *The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	**Test Engineer:-**	Nicola Cartwright
	32 %RH	**Date of Issue:-**	July 4, 2022
	1014 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

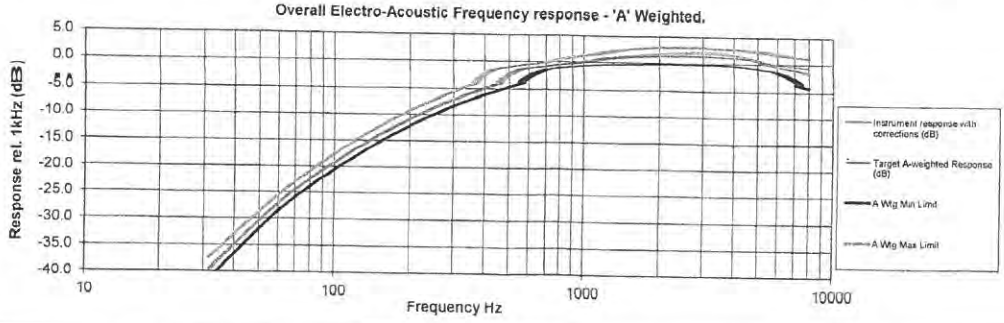
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - *A Weighted*

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Email: info@casellasolutions.cn

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 17320
Description Quest SoundPro DL-2-1/3
Calibrated 5/27/2022

Manufacturer Quest
Model Number SoundPro DL-2-1/3
Serial Number BIJ090026
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 40

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

				(As Of Cal Entry Date)	
Test Instrument ID	Description	Manufacturer	Serial Number	Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

CASELLA

Certificate of Conformity and Calibration



Instrument Model:-	CEL-633C		
Serial Number	0442231		
Firmware revision	V129-09		
Microphone Type:-	CEL-252	Preamplifier Type:-	CEL-495
Serial Number	89713	Serial Number	001775
Instrument Class/Type:-	2		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C 25 %RH 1015 mBar	Test Engineer:- Date of Issue:-	Paul Blackwell December 22, 2021

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

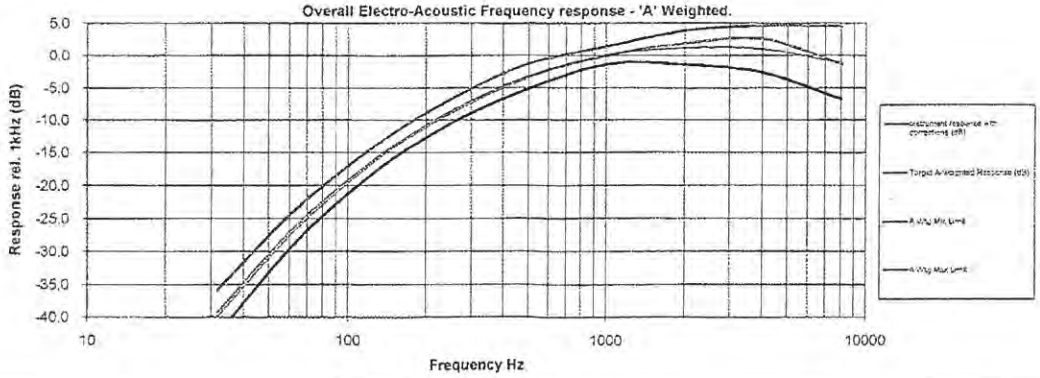
Test Summary:-

Self Generated Noise Test	All Tests Pass
Electrical Signal Test Of Frequency Weightings	All Tests Pass
Frequency & Time Weightings At 1 kHz	All Tests Pass
Level Linearity On The Reference Level Range	All Tests Pass
Toneburst Response Test	All Tests Pass
C-peak Sound Levels	All Tests Pass
Overload Indication	All Tests Pass
Acoustic Tests	All Tests Pass

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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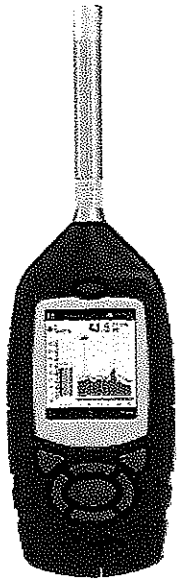
Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	4637949		
Firmware revision	V129-09		
Microphone Type:-	**CEL-252**	**Preamplifier Type:-**	**CEL-495**
Serial Number	60590	Serial Number	002125
Instrument Class/Type:-	**2**		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	23 °C	**Test Engineer:-**	Paul Blackwell
	33 %RH	**Date of Issue:-**	December 14, 2021
	1021 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

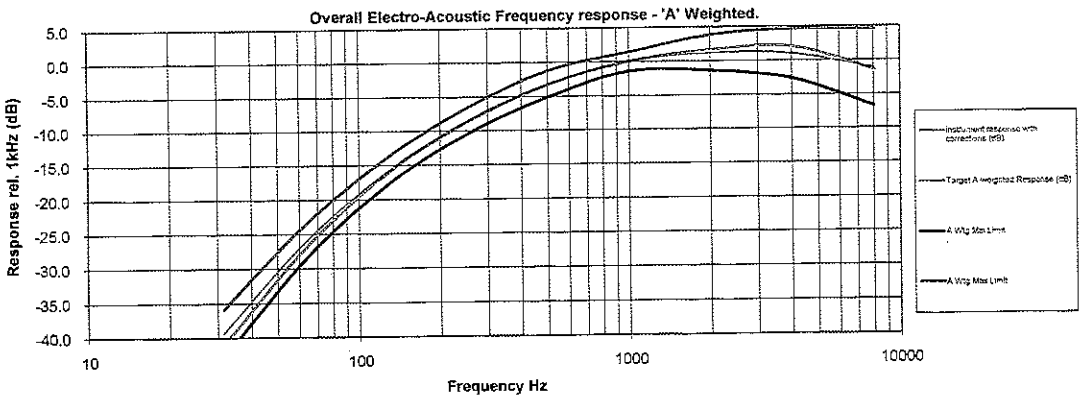
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Email: info@casellasolutions.cn

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Certificate of Conformity and Calibration



Instrument Model:- CEL-633C

Serial Number 2145334
Firmware revision V129-09

Microphone Type:- CEL-251
Serial Number 5766

Preamplifier Type:- CEL-495
Serial Number 004239

Instrument Class/Type:- 1

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-

23 °C
29 %RH
999 mBar

Test Engineer:- Paul Blackwell
Date of Issue:- April 12, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

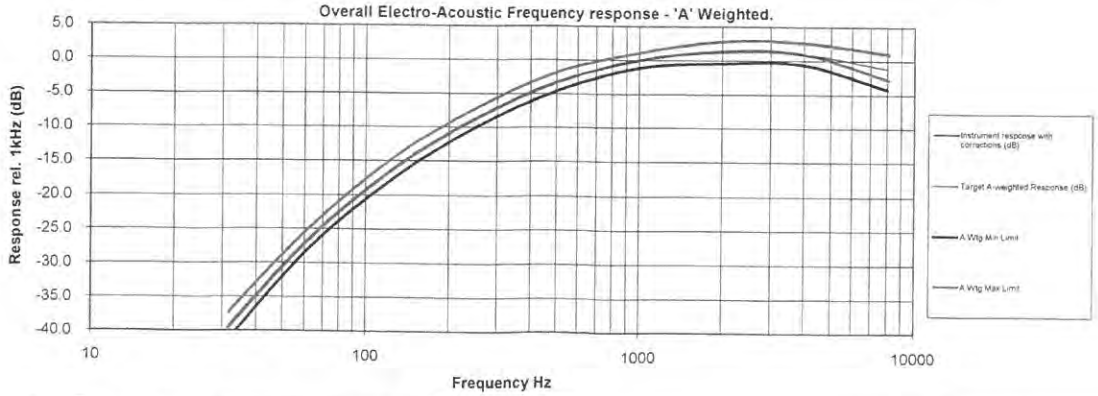
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-120/1
Serial Number:	5230919
Job Number:	25508
Date of Issue:	12-Apr-2022
Engineer:	P Blackwell

Traceable Equipment:		
	Reference Calibrator	EQ11085
	DVM type Fluke 45	EQ00318

Test Conditions:

Ambient Temperature	23.0	°C
Ambient Humidity	29.0	%RH
Ambient Pressure	999	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.04 dB	N/A dB	1.0000 kHz
Final Reading	114.00 dB	N/A dB	1.0000 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

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Tel: +61 3 9562 0175
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APPENDIX C -
PHOTO LOG

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Photo 1: M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad.



Photo 2: M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad.



Photo 3: M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad.



Photo 4: M-4 – Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad.



Photo 5: M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad.

APPENDIX D -
MODEL DATA

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SOUND SOURCE

SOURCE	SOUND POWER LEVEL dB	SOUND POWER LEVEL dB(A)	HEIGHT ABOVE GROUND (m)
M109A3GN (155 mm) Howitzer	180.8	163.2	2
40 Ton Haul Truck	117.6	115.7	2

MODEL CONFIGURATION

MODEL PARAMETER	SETTINGS
Atmospheric Absorption	20°C / 70% Humidity
Ground Absorption	0.7G Ground Factor
Receiver Height	1.5 meters for sound level isolines and receivers
Model Radius	3,218 m

MODELED SOUND LEVEL AT RECEIVERS

M 109 No Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	75	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	107	1.5

M 109 with Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	67	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	100	1.5

40-Ton Haul Truck No Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	44	1.5
M-2	20	1.5
M-3	33	1.5
M-4	33	1.5
M-5	60	1.5

APPENDIX E –
2022 BALLISTICS TEST RANGE SOUND ANALYSES SCOPE OF WORK

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H2H GEOSCIENCE ENGINEERING

179 River Street, Troy, New York 12180

Environmental Professionals
Geologic Consultants
Construction Services

(518) 270-1620/Fax (518) 270-1672

November 9, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analysis at the above reference site.

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following Scope of Work (SOW).

Scope of Work

H2H intends to collect ambient (no unapproved UCI operations taking place) sound levels, as well has additional sound level modeling to support a revised sound study, to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application.

Task 1: Sound Level Monitoring

H2H has developed a Site Overview Map (Figure 1) showing all identified receptors within a two-mile radius (Project Area) of the ballistics testing Firing Pad. The Firing Pad (100 ft. by 100 ft.) is in the northeast corner of parcel 38.1-1-31.000 (UCI Site). The Control Operations Area is located adjacent to the Firing Pad; the Target Area is located 590 ft. west of the Firing Pad (Figure 2).

Forty-two Residential Receptors (occupied residential structure) were identified with the two-mile radius. Four parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius.

Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Firing Pad to best determine ambient sound level conditions in the Project Area. H2H will conduct sound level monitoring at each of the identified five-monitoring location (Figure 1) to identify, and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for the area surrounding each monitoring location.

The following is a description of each sound monitoring location:

M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-2 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surround Pulsifer Rd.

M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

M-4 - Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Task 2: Sound Level Modeling

Based on source sound level data (loudest kinetic systems to be tested) provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURES

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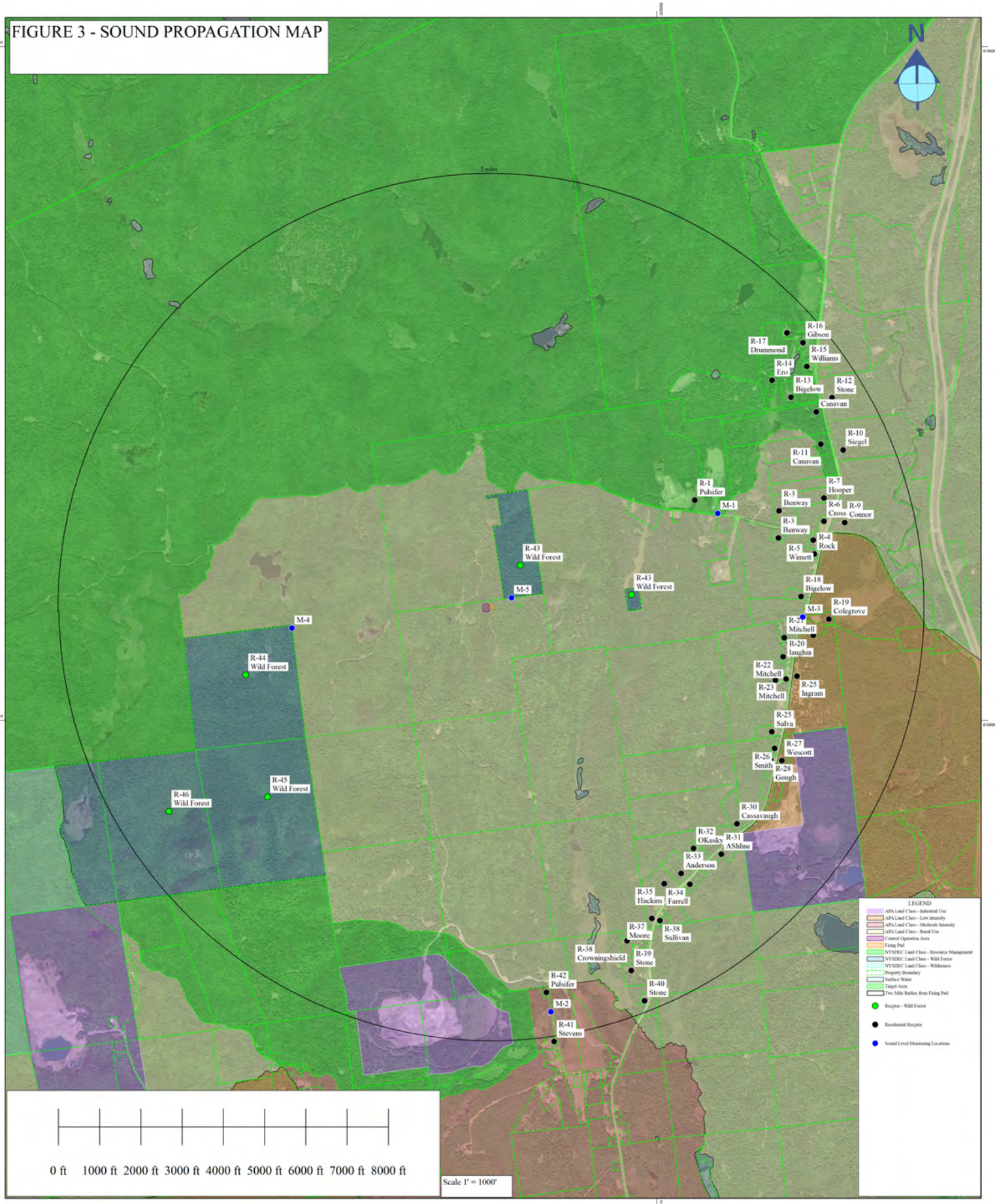
FIGURE 3 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
M-1
R-7 Hooper
R-3 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
M-5
R-43 Wild Forest
R-18 Bigelow
M-3
R-19 Colegrove
M-4
R-21 Mitchell
R-20 laughin
R-44 Wild Forest
R-22 Mitchell
R-25 Ingram
R-23 Mitchell
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-42 Pulsifer
R-40 Stone
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Receptor - Wild Forest
Residential Receptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1" = 1000'

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FIGURE - 2 SITE MAP



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APPENDIX F –
INPUT DATA and RESULTS of SOUND PROPGATION MODELS

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Noise Mapping Results 40 ton haul truck / No Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
M-1	1.5	44.39		21.03	19.76	23.27	35.13	42.26	38.29	23.78	-20.33
M-2	1.5	20.1		6.99	7.74	10.78	16.84	14.8	-0.03	-49.88	-225.27
M-3	1.5	32.75		14.6	12.56	16.68	26.08	30.73	23.04	-3.93	-95.95
M-4	1.5	32.8		12.96	14.15	18.5	27.88	29.95	22.73	-2.68	-87.75
M-5	1.5	60.42		32.52	36.21	37.12	49.88	57.52	55.59	48.12	31.51
Test Point	1.5	56.47		29.62	32.37	33.48	46.17	53.74	51.49	42.89	21.99

*** Receiver Results - Sources Analysis ***

Receiver Name	Point	Point-2	Point-3
M-1 [1.5m]	44.36	21.12	17.91
M-2 [1.5m]	12.74	16.13	16.29
M-3 [1.5m]	32.37	19.64	18.25
M-4 [1.5m]	18.79	28.99	30.17
M-5 [1.5m]	21.75	59.97	50.33
Test Point [1.5m]	14.09	55.98	46.69

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-1	Point	670.31	224.5	254.58	63	109	-67.53	-0.06	5.53	0	-	-	-	0	-26.2	20.74
M-1	Point	670.31	224.5	254.58	125	107	-67.53	-0.23	-3.86	0	-	-	-	0	-16.1	19.29
M-1	Point	670.31	224.5	254.58	250	107	-67.53	-0.76	-7.46	0	-	-	-	0	-8.6	22.66
M-1	Point	670.31	224.5	254.58	500	111	-67.53	-1.88	-3.38	0	-	-	-	0	-3.2	35.02
M-1	Point	670.31	224.5	254.58	1000	112	-67.53	-3.34	1.1	0	-	-	-	0	0	42.24
M-1	Point	670.31	224.5	254.58	2000	109	-67.53	-6.04	1.66	0	-	-	-	0	1.2	38.29
M-1	Point	670.31	224.5	254.58	4000	104	-67.53	-15.36	1.66	0	-	-	-	0	1	23.78
M-1	Point	670.31	224.5	254.58	8000	98	-67.53	-51.36	1.66	0	-	-	-	0	-1.1	-20.33
M-1	Point-2	1824.41	224.5	421.6	63	109	-76.22	-0.16	5.83	-5.55	-5.55	-	-	0	-26.2	6.69
M-1	Point-2	1824.41	224.5	421.6	125	107	-76.22	-0.62	-5.49	-0.84	-0.84	-	-	0	-16.1	7.72
M-1	Point-2	1824.41	224.5	421.6	250	107	-76.22	-2.07	-7.37	-0.17	-0.17	-	-	0	-8.6	12.57
M-1	Point-2	1824.41	224.5	421.6	500	111	-76.22	-5.1	-3.29	-5.95	-5.95	-	-	0	-3.2	17.23
M-1	Point-2	1824.41	224.5	421.6	1000	112	-76.22	-9.08	1.19	-11.4	-11.4	-	-	0	0	16.48
M-1	Point-2	1824.41	224.5	421.6	2000	109	-76.22	-16.45	1.75	-13.92	-13.92	-	-	0	1.2	5.36
M-1	Point-2	1824.41	224.5	421.6	4000	104	-76.22	-41.8	1.75	-16.65	-16.65	-	-	0	1	-27.93
M-1	Point-2	1824.41	224.5	421.6	8000	98	-76.22	-139.79	1.75	-19.52	-19.52	-	-	0	-1.1	-136.88
M-1	Point-3	1908.29	224.5	408.01	63	109	-76.61	-0.17	5.83	-6.58	-6.58	-	-	0	-26.2	5.27
M-1	Point-3	1908.29	224.5	408.01	125	107	-76.61	-0.65	-5.49	-2.36	-2.36	-	-	0	-16.1	5.79
M-1	Point-3	1908.29	224.5	408.01	250	107	-76.61	-2.16	-7.37	-2.27	-2.27	-	-	0	-8.6	9.99
M-1	Point-3	1908.29	224.5	408.01	500	111	-76.61	-5.34	-3.29	-8.58	-8.58	-	-	0	-3.2	13.98
M-1	Point-3	1908.29	224.5	408.01	1000	112	-76.61	-9.5	1.19	-14.43	-14.43	-	-	0	0	12.65
M-1	Point-3	1908.29	224.5	408.01	2000	109	-76.61	-17.21	1.75	-17.2	-17.2	-	-	0	1.2	0.93
M-1	Point-3	1908.29	224.5	408.01	4000	104	-76.61	-43.72	1.75	-20.09	-20.09	-	-	0	1	-33.67
M-1	Point-3	1908.29	224.5	408.01	8000	98	-76.61	-146.22	1.75	-23.03	-23.03	-	-	0	-1.1	-147.21
M-2	Point	3847.96	223.45	254.58	63	109	-82.7	-0.35	5.92	-4.77	-4.77	-	-	0	-26.2	0.9
M-2	Point	3847.96	223.45	254.58	125	107	-82.7	-1.31	-5.46	0	0.69	-	-	0	-16.1	1.43
M-2	Point	3847.96	223.45	254.58	250	107	-82.7	-4.36	-7.34	0	2.57	-	-	0	-8.6	4
M-2	Point	3847.96	223.45	254.58	500	111	-82.7	-10.77	-3.26	-1.51	-1.51	-	-	0	-3.2	9.56
M-2	Point	3847.96	223.45	254.58	1000	112	-82.7	-19.15	1.22	-4.77	-4.77	-	-	0	0	6.59
M-2	Point	3847.96	223.45	254.58	2000	109	-82.7	-34.7	1.78	-4.77	-4.77	-	-	0	1.2	-10.2
M-2	Point	3847.96	223.45	254.58	4000	104	-82.7	-88.16	1.78	-4.77	-4.77	-	-	0	1	-68.86
M-2	Point	3847.96	223.45	254.58	8000	98	-82.7	-294.83	1.78	-4.77	-4.77	-	-	0	-1.1	-283.63
M-2	Point-2	3033.08	223.45	421.6	63	109	-80.64	-0.27	5.9	-4.92	-4.92	-	-	0	-26.2	2.87
M-2	Point-2	3033.08	223.45	421.6	125	107	-80.64	-1.03	-5.47	0	0.41	-	-	0	-16.1	3.76
M-2	Point-2	3033.08	223.45	421.6	250	107	-80.64	-3.43	-7.35	0	2.02	-	-	0	-8.6	6.98
M-2	Point-2	3033.08	223.45	421.6	500	111	-80.64	-8.49	-3.27	-2.56	-2.56	-	-	0	-3.2	12.85
M-2	Point-2	3033.08	223.45	421.6	1000	112	-80.64	-15.1	1.21	-6.68	-6.68	-	-	0	0	10.8
M-2	Point-2	3033.08	223.45	421.6	2000	109	-80.64	-27.35	1.77	-7.99	-7.99	-	-	0	1.2	-4.01
M-2	Point-2	3033.08	223.45	421.6	4000	104	-80.64	-69.49	1.77	-9.82	-9.82	-	-	0	1	-53.19
M-2	Point-2	3033.08	223.45	421.6	8000	98	-80.64	-232.4	1.77	-12.1	-12.1	-	-	0	-1.1	-226.46
M-2	Point-3	3157.54	223.45	408.01	63	109	-80.99	-0.28	5.9	-4.8	-4.8	-	-	0	-26.2	2.63
M-2	Point-3	3157.54	223.45	408.01	125	107	-80.99	-1.07	-5.47	0	0.65	-	-	0	-16.1	3.37
M-2	Point-3	3157.54	223.45	408.01	250	107	-80.99	-3.58	-7.35	0	2.47	-	-	0	-8.6	6.49
M-2	Point-3	3157.54	223.45	408.01	500	111	-80.99	-8.83	-3.27	-1.7	-1.7	-	-	0	-3.2	13.01
M-2	Point-3	3157.54	223.45	408.01	1000	112	-80.99	-15.72	1.21	-5.16	-5.16	-	-	0	0	11.35
M-2	Point-3	3157.54	223.45	408.01	2000	109	-80.99	-28.47	1.77	-5.52	-5.52	-	-	0	1.2	-3.01
M-2	Point-3	3157.54	223.45	408.01	4000	104	-80.99	-72.34	1.77	-6.16	-6.16	-	-	0	1	-52.72
M-2	Point-3	3157.54	223.45	408.01	8000	98	-80.99	-241.93	1.77	-7.21	-7.21	-	-	0	-1.1	-231.46
M-3	Point	1562.38	204.5	254.58	63	109	-74.88	-0.14	5.8	0	-	-	-	0	-26.2	13.58
M-3	Point	1562.38	204.5	254.58	125	107	-74.88	-0.53	-5.49	0	-	-	-	0	-16.1	10
M-3	Point	1562.38	204.5	254.58	250	107	-74.88	-1.77	-7.38	0	-	-	-	0	-8.6	14.38
M-3	Point	1562.38	204.5	254.58	500	111	-74.88	-4.37	-3.3	0	-	-	-	0	-3.2	25.25
M-3	Point	1562.38	204.5	254.58	1000	112	-74.88	-7.78	1.18	0	-	-	-	0	0	30.53
M-3	Point	1562.38	204.5	254.58	2000	109	-74.88	-14.09	1.74	0	-	-	-	0	1.2	22.98
M-3	Point	1562.38	204.5	254.58	4000	104	-74.88	-35.8	1.74	0	-	-	-	0	1	-3.93
M-3	Point	1562.38	204.5	254.58	8000	98	-74.88	-119.71	1.74	0	-	-	-	0	-1.1	-95.95
M-3	Point-2	2315.51	204.5	421.6	63	109	-78.29	-0.21	5.86	-5.11	-5.11	-	-	0	-26.2	5.05
M-3	Point-2	2315.51	204.5	421.6	125	107	-78.29	-0.79	-5.48	0	0.06	-	-	0	-16.1	6.34
M-3	Point-2	2315.51	204.5	421.6	250	107	-78.29	-2.62	-7.36	0	1.37	-	-	0	-8.6	10.13
M-3	Point-2	2315.51	204.5	421.6	500	111	-78.29	-6.48	-3.28	-3.66	-3.66	-	-	0	-3.2	16.09
M-3	Point-2	2315.51	204.5	421.6	1000	112	-78.29	-11.53	1.2	-8.37	-8.37	-	-	0	0	15.01
M-3	Point-2	2315.51	204.5	421.6	2000	109	-78.29	-20.88	1.76	-10.31	-10.31	-	-	0	1.2	2.48
M-3	Point-2	2315.51	204.5	421.6	4000	104	-78.29	-53.05	1.76	-12.67	-12.67	-	-	0	1	-37.26
M-3	Point-2	2315.51	204.5	421.6	8000	98	-78.29	-177.42	1.76	-15.31	-15.31	-	-	0	-1.1	-172.36
M-3	Point-3	2450.06	204.5	408.01	63	109	-78.78	-0.22	5.87	-5.21	-5.21	-	-	0	-26.2	4.46
M-3	Point-3	2450.06	204.5	408.01	125	107	-78.78	-0.83	-5.48	-0.13	-0.13	-	-	0	-16.1	5.68
M-3	Point-3	2450.06	204.5	408.01	250	107	-78.78	-2.77	-7.36	0	1.05	-	-	0	-8.6	9.49
M-3	Point-3	2450.06	204.5	408.01	500	111	-78.78	-6.86	-3.28	-4.15	-4.15	-	-	0	-3.2	14.73
M-3	Point-3	2450.06	204.5	408.01	1000	112	-78.78	-12.2	1.2	-9.07	-9.07	-	-	0	0	13.16
M-3	Point-3	2450.06	204.5	408.01	2000	109	-78.78	-22.09	1.76	-11.18	-11.18	-	-	0	1.2	-0.1
M-3	Point-3	2450.06	204.5	408.01	4000	104	-78.78	-56.13	1.76	-13.67	-13.67	-	-	0	1	-41.82
M-3	Point-3	2450.06	204.5	408.01	8000	98	-78.78	-187.73	1.76	-16.39	-16.39	-	-	0	-1.1	-184.24
M-4	Point	2712.58	461.64	254.58	63	109	-79.67	-0.24	5.88	-4.83	-4.83	-	-	0	-26.2	3.94
M-4	Point	2712.58	461.64	254.58	125	107	-79.67	-0.92	-5.47	0	0.59	-	-	0	-16.1	4.84
M-4	Point	2712.58	461.64	254.58	250	107	-79.67	-3.07	-7.35	0	2.36	-	-	0	-8.6	8.31
M-4	Point	2712.58	461.64	254.58	500	111	-79.67	-7.59	-3.27	-1.94	-1.94	-	-	0	-3.2	15.34
M-4	Point	2712.58	461.64	254.58	1000	112	-79.67	-13.5	1.21	-5.6	-5.6	-	-	0	0	14.43
M-4	Point	2712.58	461.64	254.58	2000	109	-79.67	-24.46	1.77	-6.3	-6.3	-	-	0	1.2	1.54
M-4	Point	2712.58	461.64	254.58	4000	104	-79.67	-62.15	1.77	-7.43	-7.43	-	-	0	1	-42.48
M-4	Point	2712.58	461.64	254.58	8000	98	-79.67	-207.84	1.77	-9.07	-9.07	-	-	0	-1.1	-197.91
M-4	Point-2	1525.05	461.64	421.6	63	109	-74.67	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	9.02
M-4	Point-2	1525.05	461.64	421.6	125	107	-74.67	-0.52	-5.49	0	0.72	-	-	0	-16.1	10.23
M-4	Point-2	1525.05	461.64	421.6	250	107	-74.67	-1.73	-7.38	0	2.61	-	-	0	-8.6	14.63
M-4	Point-2	1525.05	461.64	421.6	500	111	-74.67	-4.27	-3.3	-1.47	-1.47	-	-	0	-3.2	24.1
M-4	Point-2	1525.05	461.64	421.6	1000	112	-74.67	-7.59	1.18	-4.77	-4.77	-	-	0	0	26.15
M-4	Point-2	1525.05	461.64	421.6	2000	109	-74.67	-13.75	1.74	-4.77	-4.77	-	-	0	1.2	18.75
M-4	Point-2	1525.05	461.64	421.6	4000	104	-74.67	-34.94	1.74	-4.77	-4.77	-	-	0	1	-7.64
M-4	Point-2	1525.05	461.64	421.6	8000	98	-74.67	-116.85	1.74	-4.77	-4.77	-	-	0	-1.1	-97.65
M-4	Point-3	1410.76	461.64	408.01	63	109	-73.99	-0.13	5.78	-4.77	-4.77	-	-	0	-26.2	9.69
M-4	Point-3	1410.76	461.64	408.01	125	107	-73.99	-0.48	-5.48	0	0.71	-	-	0	-16.1	10.95
M-4	Point-3	1410.76	461.64	408.01	250	107	-73.99	-1.6	-7.38	0	2.61	-	-	0	-8.6	15.43
M-4	Point-3	1410.76	461.64	408.01	500	111	-73.99	-3.95	-3.3	-1.47	-1.47	-	-	0	-3.2	25.09
M-4	Point-3	1410.76	461.64	408.01	1000	112	-73.99	-7.02	1.18	-4.77	-4.77	-	-	0	0	27.39
M-4	Point-3	1410.76	461.64	408.01	2000	109	-73.99	-12.72	1.73	-4.77	-4.77	-	-	0	1.2	20.45
M-4	Point-3	1410.76	461.64	408.01	4000	104	-73.99	-32.32	1.73	-4.77	-4.77	-	-	0	1	-4.35
M-4	Point-3	1410.76	461.64	408.01	8000	98	-73.99	-108.09	1.73	-4.77	-4.77	-	-	0	-1.1	-88.22
M-5	Point	1153.41	419.14	254.58	63	109	-72.24	-0.1	5.72	-8.13	-8.13	-	-	0	-26.2	8.05
M-5	Point	1153.41	419.14	254.58	125	107	-72.24	-0.39	-5.36	-4.63	-4.63	-	-	0	-16.1	8.28
M-5	Point	1153.41	419.14	254.58	250	107	-72.24	-1.31	-7.4	-4.9	-4.9	-	-	0	-8.6	12.55
M-5	Point	1153.41	419.14	254.58	500	111	-72.24	-3.23	-3.32	-11.59	-11.59	-	-	0	-3.2	17.42
M-5	Point	1153.41	419.14	254.58	1000	112	-72.24	-5.74	1.16	-17.71	-17.71	-	-	0	0	17.47
M-5	Point	1153.41	419.14	254.58	2000	109	-72.24	-10.4	1.72	-20.61	-20.61	-	-	0	1.2	8.67
M-5	Point	1153.41	419.14	254.58	4000	104	-72.24	-26.43	1.72	-23.56	-23.56	-	-	0	1	-15.51
M-5	Point	1153.41	419.14	254.58	8000	98	-72.24	-88.38	1.72	-25	-25	-	-	0	-1.1	-87
M-5	Point-2	154.71	419.14	421.6	63	109	-54.79	-0.01	3.96	0	-	-	-	0	-26.2	31.96
M-5	Point-2	154.71	419.14	421.6	125	107	-54.79	-0.05	-0.34	0	-	-	-	0	-16.1	35.71
M-5	Point-2	154.71	419.14	421.6	250	107	-54.79	-0.18	-7.51	0	-	-	-	0	-8.6	35.92
M-5	Point-2	154.71	419.14	421.6	500	111	-54.79	-0.43	-3.62	0	-	-	-	0	-3.2	48.96
M-5	Point-2	154.71	419.14	421.6	1000	112	-54.79	-0.77	0.66	0	-	-	-	0	0	57.1
M-5	Point-2	154.71	419.14	421.6	2000	109	-54.79	-1.39	1.19	0	-	-	-	0	1.2	55.2
M-5	Point-2	154.71	419.14	421.6	4000	104	-54.79	-3.54	1.19	0	-	-	-	0	1	47.85
M-5	Point-2	154.71	419.14	421.6	8000	98	-54.79	-11.85	1.19	0	-	-	-	0	-1.1	31.44
M-5	Point-3	268.37	419.14	408.01	63	109	-59.57	-0.02	4.83	-4.77	-4.77	-	-	0	-26.2	23.26
M-5	Point-3	268.37	419.14	408.01	125	107	-59.57	-0.09	-0.85	-3.93	-3.93	-	-	0	-16.1	26.46
M-5	Point-3	268.37	419.14	408.01	250	107	-59.57	-0.3	-7.63	0	2.85	-	-	0	-8.6	30.9
M-5	Point-3	268.37	419.14	408.01	500	111	-59.57	-0.75	-3.57	-1.21	-1.21	-	-	0	-3.2	42.7
M-5	Point-3	268.37	419.14	408.01	1000	112	-59.57	-1.34	0.89	-4.77	-4.77	-	-	0	0	47.21
M-5	Point-3	268.37	419.14	408.01	2000	109	-59.57	-2.42	1.45	-4.77	-4.77	-	-	0	1.2	44.88
M-5	Point-3	268.37	419.14	408.01	4000	104	-59.57	-6.15	1.45	-4.77	-4.77	-	-	0	1	35.95
M-5	Point-3	268.37	419.14	408.01	8000	98	-59.57	-20.56	1.45	-4.78	-4.78	-	-	0	-1.1	13.43
Test Point	Point	1132.57	424.34	254.58	63	109	-72.08	-0.1	5.72	-15.33	-15.33	-	-	0	-26.2	1.01
Test Point	Point	1132.57	424.34	254.58	125	107	-72.08	-0.38	-5.34	-12.89	-12.89	-	-	0	-16.1	0.2
Test Point	Point	1132.57	424.34	254.58	250	107	-72.08	-1.28	-7.4	-13.78	-13.78	-	-	0	-8.6	3.86
Test Point	Point	1132.57	424.34	254.58	500	111	-72.08	-3.17	-3.32	-20.83	-20.83	-	-	0	-3.2	8.4
Test Point	Point	1132.57	424.34	254.58	1000	112	-72.08	-5.64	1.16	-25	-25	-	-	0	0	10.44
Test Point	Point	1132.57	424.34	254.58	2000	109	-72.08	-10.21	1.72	-25	-25	-	-	0	1.2	4.62
Test Point	Point	1132.57	424.34	254.58	4000	104	-72.08	-25.95	1.72	-25	-25	-	-	0	1	-16.31
Test Point	Point	1132.57	424.34	254.58	8000	98	-72.08	-86.78	1.72	-25	-25	-	-	0	-1.1	-85.24
Test Point	Point-2	234.34	424.34	421.6	63	109	-58.4	-0.02	4.66	0	-	-	-	0	-26.2	29.04
Test Point	Point-2	234.34	424.34	421.6	125	107	-58.4	-0.08	-0.65	0	-	-	-	0	-16.1	31.77
Test Point	Point-2	234.34	424.34	421.6	250	107	-58.4	-0.27	-7.64	0	-	-	-	0	-8.6	32.1
Test Point	Point-2	234.34	424.34	421.6	500	111	-58.4	-0.66	-3.59	0	-	-	-	0	-3.2	45.15
Test Point	Point-2	234.34	424.34	421.6	1000	112	-58.4	-1.17	0.84	0	-	-	-	0	0	53.28
Test Point	Point-2	234.34	424.34	421.6	2000	109	-58.4	-2.11	1.4	0	-	-	-	0	1.2	51.09
Test Point	Point-2	234.34	424.34	421.6	4000	104	-58.4	-5.37	1.4	0	-	-	-	0	1	42.63
Test Point	Point-2	234.34	424.34	421.6	8000	98	-58.4	-17.96	1.4	0	-	-	-	0	-1.1	21.94
Test Point	Point-3	380.37	424.34	408.01	63	109	-62.6	-0.03	5.17	-4.77	-4.77	-	-	0	-26.2	20.56
Test Point	Point-3	380.37	424.34	408.01	125	107	-62.6	-0.13	-1.65	-3.12	-3.12	-	-	0	-16.1	23.4
Test Point	Point-3	380.37	424.34	408.01	250	107	-62.6	-0.43	-7.56	0	2.79	-	-	0	-8.6	27.8
Test Point	Point-3	380.37	424.34	408.01	500	111	-62.6	-1.06	-3.48	-1.29	-1.29	-	-	0	-3.2	39.36
Test Point	Point-3	380.37	424.34	408.01	1000	112	-62.6	-1.89	0.99	-4.77	-4.77	-	-	0	0	43.73
Test Point	Point-3	380.37	424.34	408.01	2000	109	-62.6	-3.43	1.55	-4.77	-4.77	-	-	0	1.2	40.95
Test Point	Point-3	380.37	424.34	408.01	4000	104	-62.6	-8.71	1.55	-4.77	-4.77	-	-	0	1	30.46
Test Point	Point-3	380.37	424.34	408.01	8000	98	-62.6	-29.14	1.55	-4.77	-4.77	-	-	0	-1.1	1.93

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5
Test Point	355.58	-8.26	1.5

Point Sources	x	y	Height	Lw	Hz
Point	1133.26	-813.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000
Point-2	121.26	-6.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000
Point-3	-9.74	-112.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000

Ground Height Points	x	y	Height
-	134.08	295.24	480
-	514.08	-44.76	475

Ground Height Lines	x	y	Height
-	4476.27	2642.71	163
-	4430.44	2830.57	
-	4390.79	2796.89	
-	4201.84	2828.04	
-	4117.14	2864.1	
-	4098.98	2926.24	
-	4059.83	2971.18	
-	4011.51	2892.73	
-	3906.23	2834.88	
-	3824.28	2863.63	
-	3851.44	2784.45	
-	3811.91	2761.54	
-	3781.83	2689.14	
-	3742	2649.37	
-	3749.31	2601.68	
-	3791.18	2563.94	
-	3764.8	2488.74	
-	3773.32	2376.23	

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-	3743.06	2360.98		-
-	3687.72	2389.28		-
-	3639.09	2389.21		-
-	3535.5	2333.86		-
-	3440.6	2250.16		-
-	3416.01	2183.17		-
-	3364.78	2120.28		-
-	3372.67	2100.43		-
-	3355.11	2100.73		-
-	3388.22	1997.46		-
-	3349.65	1865.71		-
-	3366.62	1826.87		-
-	3391.38	1935.46		-
-	3464.55	1963.86		-
-	3486.94	2004.47		-
-	3519.04	2019.65		-
-	3546.25	2121.98		-
-	3653.14	2165.99		-
-	3671.98	2282.77		-
-	3764.26	2303.52		-
-	3856.52	2368.63		-
-	3940.82	2328.01		-
-	3970.3	2287.25		-
-	4019.57	2274.47		-
-	4022.31	2292.04		-
-	4124.68	2342.09		-
-	4101.27	2381.59		-
-	4107.37	2416.37		-
-	4202.15	2523.69		-
-	4283.96	2502.63		-
-	4357.19	2438.58		-
-	4363.94	2332.52		-
-	4265.78	2257.63		-
-	4178.56	2291.79		-
-	4151.03	2283.02		-
-	4199.26	2219.83		-
-	4167.36	2192.97		-
-	4138.45	2094.77		-
-	4067.99	2086.64		-
-	4063.55	2058.89		-
-	4095.48	2017.32		-
-	4128.51	2013.63		-
-	4138.09	1941.77		-
-	4178	1894.95		-
-	4165.88	1861.5		-
-	4255.87	1615.7		-
-	4318.49	1539.34		-
-	4382.92	1398.92		-
-	4485.41	1294.85		-
-	3594.69	3017.68	183	-
-	3645.24	2688.77		-
-	3613.14	2673.89		-
-	3588.39	2622.64		-
-	3596.83	2558.97		-
-	3572.11	2512.01		-
-	3512.54	2496.05		-
-	3419.5	2508.32		-
-	3373.96	2471.03		-
-	3329.68	2386.01		-
-	3307.92	2383.31		-
-	3312.02	2314.45		-
-	3284.28	2210.16		-
-	3232.54	2144.41		-
-	3184.94	2145.89		-
-	3272.35	2083.34		-
-	3281.62	2043.17		-
-	3269.04	2002.9		-
-	3244.3	1991.11		-
-	3235.51	1914.5		-
-	3207.34	1915.27		-
-	3195.96	1871.49		-
-	3135.62	1808.15		-
-	3165.66	1804.61		-
-	3144.44	1776.45		-
-	3162.67	1743.88		-
-	3083.12	1685.93		-
-	3063.16	1693.4		-
-	2964.53	1640.22		-
-	2870.85	1648.8		-
-	2830.17	1605.47		-
-	2799.61	1632.88		-
-	2750.73	1633.43		-
-	2728.07	1601.99		-
-	2736.24	1570.55		-
-	2717.33	1576.64		-
-	2772.53	1483.59		-
-	2770.73	1356.54		-
-	2786.68	1338.7		-
-	2824.25	1350.47		-
-	2866.72	1329.11		-
-	2896.16	1243.66		-
-	2888.14	1125.91		-
-	2923.34	1077.52		-
-	2956.56	955.85		-
-	2996.48	884.09		-
-	3106	804.81		-
-	3159.44	791.41		-
-	3258.78	824.31		-
-	3300.04	766.56		-
-	3308.9	780.48		-
-	3309.72	645.39		-
-	3211.17	593.27		-
-	3183.95	552.44		-
-	3192.45	512.32		-
-	3233.64	466.61		-
-	3233.39	431.04		-
-	3247.93	445.2		-
-	3306.57	429.55		-
-	3296.6	456.5		-
-	3314.19	464.32		-
-	3272.53	524.22		-
-	3289.52	507.2		-
-	3327.76	570.78		-
-	3397.76	650.88		-
-	3426.14	718.82		-
-	3459.02	818.24		-
-	3478.57	930.75		-
-	3469.96	1027.54		-
-	3492.7	1105.11		-
-	3535.9	1196.06		-
-	3512.35	1259.78		-
-	3559.09	1319.83		-
-	3574.64	1332.32		-
-	3538.39	1284.06		-
-	3522.64	1276.34		-
-	3496.08	1359.41		-
-	3342.46	1402.24		-
-	3308.89	1549.61		-
-	3363.1	1632.65		-
-	3364.78	1713.09		-
-	3417.19	1834.54		-
-	3405.82	1944.13		-
-	3506.53	2087.38		-
-	3567.49	2212.77		-
-	3675.23	1934.65		-
-	3699.02	1957.08		-
-	3727.21	1942.74		-
-	3742.56	2097.35		-
-	3753.32	1980.47		-
-	3763.88	1808.15		-
-	3802.63	1804.61		-
-	3811.73	1776.45		-
-	3823.85	1743.88		-
-	3805.88	1626.67		-
-	3887.74	1685.93		-
-	3899.55	1693.4		-
-	3951.71	1640.22		-
-	4028.1	1648.8		-
-	4037.71	1605.47		-
-	4100.34	1632.88		-
-	4136.68	1633.43		-
-	4108.07	1601.99		-
-	4152.96	1576.64		-
-	4224.07	1570.55		-
-	4299.42	1483.59		-
-	4241.39	1356.54		-
-	4271.46	1338.7		-
-	4485.41	1350.47		-
-	4491.51	1329.11		-
-	4473.22	1243.66		-
-	4491.51	1125.91		-
-	4431.61	1077.52		-
-	4390.07	955.85		-
-	4202.89	884.09		-
-	4159.14	804.81		-
-	4104.34	791.41		-
-	4321.04	824.31	183	-
-	4378.05	766.56		-
-	4417.29	780.48		-
-	4439.62	645.39		-
-	4502.06	593.27	203	-
-	4439.32	552.44		-
-	4413.69	512.32		-
-	4408.65	466.61		-
-	4486.92	431.04		-
-	4456.85	445.2		-
-	4400.39	429.55		-
-	4386.16	456.5		-
-	4363.81	464.32		-
-	4335.29	507.2		-
-	4260.53	524.22		-
-	4233.87	570.78		-
-	4243.27	650.88		-
-	4317.14	718.82		-
-	4324.26	818.24		-
-	4354.41	930.75		-
-	4327.26	1027.54		-
-	4159.86	1105.11		-
-	4061.98	1196.06		-
-	3822.36	1259.78		-
-	3822.98	1319.83		-
-	3827.98	1332.32		-
-	3810.67	1284.06		-
-	3804.57	1276.34		-
-	3857.41	1359.41		-
-	3852.52	1402.24		-
-	3813.37	1549.61		-
-	3867.85	1632.65		-
-	3904.69	1713.09		-
-	3820.65	1834.54		-
-	3777.99	1944.13		-
-	3788.82	2087.38		-
-	3740.2	2212.77		-
-	3750.28	1934.65		-
-	3779.66	1957.08		-
-	3767.72	1942.74		-
-	3791.68	2097.35		-
-	3847.37	1808.15		-
-	3842.08	1804.61		-
-	3736.75	1776.45		-
-	3734.98	1743.88		-
-	3674.62	1626.67		-
-	3611.09	1685.93		-
-	3530.27	1693.4		-
-	3514.23	1640.22		-
-	3457.1	1648.8		-
-	3503.21	1605.47		-
-	3482.05	1632.88		-
-	3532.15	1633.43		-
-	3591.78	1601.99		-
-	3629.64	1576.64		-
-	3669.66	1570.55		-
-	3635.44	1483.59		-
-	3633.49	1356.54		-
-	3565.33	1338.7		-
-	3528.73	1350.47		-
-	3473.16	1329.11		-
-	3388.71	1243.66		-
-	3383.98	1125.91		-
-	3418.95	1077.52		-
-	3319.94	955.85		-
-	3295.25	884.09		-
-	3310.15	804.81		-
-	3210.96	791.41		-
-	3208.1	824.31		-
-	3235.67	780.48		-
-	3191.69	766.56		-
-	3087.93	645.39		-
-	3083.67	593.27		-
-	3063.58	552.44		-

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-	3419.08	-1622.37		
-	3430.8	-1600.17		
-	3449.19	-1643.67		
-	3451.06	-1745.27		
-	3471.84	-1351.55		
-	3418.5	-791.65		
-	3469.51	-1056.25		
-	3441.42	-828.88		
-	3441.04	-700.73		
-	3465.75	-641.37		
-	3446.01	-593.29		
-	3458.94	-482.49		
-	3506.47	-371.28		
-	3622.14	-435.59		
-	3699.88	-392.94		
-	3767.16	-396.79		
-	3781.04	-373.92		
-	3738.77	-271.92		
-	3673.97	-198.07		
-	3651.55	-126.28		
-	3667.95	42.3		
-	3689.28	89.27		
-	3820.21	219.07		
-	3969.35	274.58		
-	4081.02	197.45		
-	4140.88	122.1		
-	4184.05	38.74		
-	4211.09	-126.77		
-	4375.59	-150.46		
-	4436.7	-94.41		
-	4475.21	-99.37		
-	4476.18	-64.72		
-	4491.51	-60.58		
-	2393.22	-1995.02	203	
-	2369.22	-1911.21		
-	2387.14	-1880.46		
-	2331.13	-1755.85		
-	2296.52	-1755.15		
-	2279.22	-1765.73		
-	2327.22	-1843.86		
-	2322.41	-1883.51		
-	2364.02	-1983.23		
-	3368.37	-1214.53	203	
-	3356.8	-1234.38		
-	3337.14	-1226.14		
-	3299.77	-1134.03		
-	3345.42	-887.06		
-	3364.67	-974.94		
-	3500.83	-1923.06	203	
-	3566.38	-1909.36		
-	3543.81	-1868.2		
-	3567.89	-1844.12		
-	3579.93	-1861.98		

-	3553.81	-1868.27	
-	3587.93	-1879.06	
-	3616.75	-1876.63	
-	3639.27	-1842.25	
-	3616.63	-1824.65	
-	3597.69	-1644.77	
-	3496	-1375.18	
-	3441.5	-1969.04	
-	2559.18	-261.97	203
-	2525.77	-265.34	
-	2543.69	-250.32	
-	2519.25	-231.18	
-	2507.16	-175.68	
-	2514.22	-54.6	
-	2540.88	-107.47	
-	2523	-125.81	
-	2543.61	-139.74	
-	2534.83	-179.13	
-	2903.28	1743.62	203
-	2837.27	1794.44	
-	2832.79	1872.59	
-	2803.14	1892.65	
-	2854.83	1911.14	
-	2866.96	1979.68	
-	2909.69	1968.85	
-	2976.75	1812.77	
-	2955.08	1762.14	
-	1327.79	4059.99	203
-	1317.27	3980.75	
-	1285.4	3942.13	
-	1201.19	3924.44	
-	1135.83	3938.18	
-	1141.44	4022.81	
-	1170.44	4037.38	
-	1155.12	4080.55	
-	1190.54	4087.52	
-	1220.56	4059.3	
-	1352.38	4111.69	
-	1556.32	4505.11	203
-	1590.73	4352.98	
-	1579.9	4248.86	
-	1624.55	4296.83	
-	1648.89	4298.03	
-	1584.22	4099.2	
-	1546.57	4069.14	
-	1507.42	4095.82	
-	1530.11	4136.39	
-	1531.29	4194.93	
-	1556.77	4196.77	
-	1580.12	4244.83	
-	1524.03	4202.36	
-	1434.38	4186.54	
-	1407.45	4190.44	
-	1369.22	4250.42	
-	1403.34	4359.46	
-	1443.16	4374.93	
-	1428.19	4505.11	
-	3495.03	3017.68	203
-	3525.4	2853.66	
-	3516.24	2750.31	
-	3493.21	2717.82	
-	3496.55	2624.36	
-	3535.33	2562.26	
-	3502.36	2549.92	
-	3381.49	2633.49	
-	3253.71	2618.62	
-	3166.31	2633.49	
-	3023.88	2577.24	
-	2965.45	2608.78	
-	2845.87	2622.29	
-	2794.46	2657.88	
-	2744.48	2651.45	
-	2693.11	2617.26	
-	2541.56	2615.14	
-	2349.84	2562.45	
-	2370.2	2489.43	
-	2360.1	2468.95	
-	2266.19	2480.1	
-	2243.08	2499.02	
-	2176.75	2476.32	
-	2141.47	2484.49	
-	2083.81	2520.55	
-	2098.8	2556.08	
-	2056.04	2556.72	
-	2015.98	2584.71	
-	1986.78	2557.85	
-	1941.4	2553.32	
-	1947.79	2511.76	
-	1934.16	2507.23	
-	1888.35	2536.39	
-	1906.33	2579.76	
-	1864.13	2626.46	
-	1781.33	2657.52	
-	1763.31	2606.43	
-	1736.06	2612.3	
-	1699.74	2667.14	
-	1699.61	2706.07	
-	1629.38	2761.91	
-	1609.79	2825.64	
-	1583.65	2829	
-	1559.41	2950.31	
-	1587.41	2995.32	
-	1586.67	3071.68	
-	1608.1	3081.73	
-	1635.55	3040.36	
-	1680.17	3037.05	
-	1663.18	3121.4	
-	1717.67	3186.02	
-	1696.4	3242.38	
-	1748.21	3391.73	
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-	1784.79	3510.6	
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-	1801.13	3754.15	
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-	2372.14	2107.16	
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-	20599.35	102.93	-
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-	21628.82	-2221.81	-
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-	3493.73	-3833.74	-

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-	3556	-217⁹.4		
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-	3746.13	-2104.49		
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	-984.1.3	-4392.0.4		-
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-		-4241.78	-1461.77	
-		-4259.89	-1487.11	
-		-4207.43	-1529.94	
-		-4454.17	1469.3	643
-		-4478.97	1442.08	
-		-4518.4	1435.55	
-		-4515.35	744.69	643
-		-4479.13	724.69	
-		-4396.48	733.99	
-		-4361.9	675.51	
-		-4395.89	628.29	
-		-4410.59	475.92	
-		-4512.3	295.59	
-		-3568.13	1475.39	643
-		-3560.17	1448.14	
-		-3579.15	1410.96	
-		-3671.03	1373.23	
-		-3729.2	1403.45	
-		-3763.31	1472.34	
-		-2157.77	1743.62	643
-		-2180.6	1806.73	
-		-2156.72	1872.24	
-		-2084.63	1925.09	
-		-2035.69	1927.83	
-		-1948.92	1847.25	
-		-1896.46	1736.34	
-		-1891.05	1664.09	
-		-1952.83	1600.2	
-		-2046.47	1570.01	
-		-2092.06	1678.8	
-		-4506.2	-666.89	663
-		-4451.56	-688.31	
-		-4285.68	-853.76	
-		-4167.56	-822.83	
-		-4016.85	-894.69	
-		-3936.29	-1127.59	
-		-3944.79	-1191.04	
-		-3982.64	-1240.78	
-		-4070.12	-1260.72	
-		-4150.17	-1241.03	
-		-4211.13	-1338.57	
-		-4350.65	-1444.72	
-		-4347.63	-1529.94	
-		-4512.3	694.37	663
-		-4468.05	655.46	
-		-4481.21	531	
-		-4512.3	469.33	
-		-3607.75	1475.39	663
-		-3611.71	1437.49	
-		-3684.12	1417.46	
-		-3716.98	1436.85	
-		-3721.14	1472.34	
-		-2119.05	1743.62	663
-		-2152.16	1780.39	
-		-2155.88	1834.64	
-		-2043.27	1912.55	
-		-1981.16	1851.91	
-		-1925.64	1714.41	
-		-1958.74	1673.12	
-		-2020.98	1666.61	
-		-4506.2	-716.96	683
-		-4465.65	-713.97	
-		-4403.16	-813.01	
-		-4295.15	-889.83	
-		-4185.87	-864.62	
-		-4067.3	-896.01	
-		-4028.41	-957.2	
-		-3974.36	-1139.77	
-		-4006.41	-1195.98	
-		-4176.67	-1196.54	
-		-4226.42	-1274.51	
-		-4360.15	-1380.31	
-		-4439.99	-1529.94	
-		-4506.2	-750.57	703
-		-4470.68	-767.59	
-		-4401.45	-859.65	
-		-4288.32	-923.27	
-		-4195.13	-894.86	
-		-4097.78	-926.5	
-		-4014.85	-1111.99	
-		-4030.71	-1130.63	
-		-4203.77	-1145.41	
-		-4247.12	-1231.25	
-		-4399.47	-1362.36	
-		-4435.72	-1468.29	
-		-4500.11	-1529.23	
-		-4503.16	-791.51	723
-		-4427.34	-888.76	
-		-4287.91	-947.28	
-		-4195.26	-921.98	
-		-4137.56	-931.57	
-		-4108.73	-962.93	
-		-4077.74	-1059.1	
-		-4088.41	-1081.79	
-		-4219.61	-1078.92	
-		-4288.47	-1220.47	
-		-4372.95	-1277.46	
-		-4500.11	-1438.72	
-		-4503.16	-873.36	743
-		-4398.31	-954.43	
-		-4329.42	-965.65	
-		-4272.98	-1033.14	
-		-4311.19	-1182.42	
-		-4500.11	-1346.35	
-		-4503.16	-924.23	763
-		-4342.94	-1045.18	
-		-4329.39	-1088.89	
-		-4358.82	-1180.58	
-		-4500.11	-1296.15	
-		-4503.16	-980.48	783
-		-4395.56	-1049.23	
-		-4378.15	-1102.63	
-		-4399.26	-1161.42	
-		-4503.16	-1245.77	
-		-4503.16	-1032.33	803
-		-4445.51	-1065.1	
-		-4434.52	-1103.24	
-		-4445.71	-1140.49	
-		-4503.16	-1197	

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Â°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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Noise Mapping Results M 109 with Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
M-5	1.5	100.39	83.36	92.65	87.57	77.14	94.53	95.69	91.67	83.74	65.77	20.97	
M-1	1.5	67.45	59.06	65.9	56.29	44.13	54.49	50.67	40.6	11.88	-92.02	-462.58	
M-3	1.5	73.34	62.12	71.18	63.68	52.04	64.72	61.2	47.96	9.35	-126.21	-607.39	
M-2	1.5	71.22	60.1	69.25	61.29	49.11	62.29	58.24	43.33	-3.65	-174.49	-789.01	
M-4	1.5	79.49	66.08	75.38	67.79	56.8	73.19	72.97	65.11	40.57	-47.17	-357.66	

*** Receiver Results - Sources Analysis ***

Receiver Name	Point
M-5 [1.5m]	100.39
M-1 [1.5m]	67.45
M-3 [1.5m]	73.34
M-2 [1.5m]	71.22
M-4 [1.5m]	79.49

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-5	Point	169.84	419.14	422.48	31.5	179.1	-55.6	0	4.14	-4.88	-4.88	-	-	0	-39.4	83.36
M-5	Point	169.84	419.14	422.48	63	175.3	-55.6	-0.02	4.14	-4.98	-4.98	-	-	0	-26.2	92.65
M-5	Point	169.84	419.14	422.48	125	164.5	-55.6	-0.06	-0.38	-4.79	-4.79	-	-	0	-16.1	87.57
M-5	Point	169.84	419.14	422.48	250	149.1	-55.6	-0.19	-7.57	0	2.03	-	-	0	-8.6	77.14
M-5	Point	169.84	419.14	422.48	500	160	-55.6	-0.48	-3.63	-2.57	-2.57	-	-	0	-3.2	94.53
M-5	Point	169.84	419.14	422.48	1000	158.7	-55.6	-0.85	0.7	-7.27	-7.27	-	-	0	0	95.69
M-5	Point	169.84	419.14	422.48	2000	155.2	-55.6	-1.53	1.24	-8.84	-8.84	-	-	0	1.2	91.67
M-5	Point	169.84	419.14	422.48	4000	151.9	-55.6	-3.89	1.24	-10.91	-10.91	-	-	0	1	83.74
M-5	Point	169.84	419.14	422.48	8000	147.6	-55.6	-13.01	1.24	-13.35	-13.35	-	-	0	-1.1	65.77
M-5	Point	169.84	419.14	422.48	16000	144.9	-55.6	-46.92	1.24	-16.05	-16.05	-	-	0	-6.6	20.97
M-1	Point	1815.25	224.5	422.48	31.5	179.1	-76.18	-0.04	5.83	-10.25	-10.25	-	-	0	-39.4	59.06
M-1	Point	1815.25	224.5	422.48	63	175.3	-76.18	-0.16	5.83	-12.68	-12.68	-	-	0	-26.2	65.9
M-1	Point	1815.25	224.5	422.48	125	164.5	-76.18	-0.62	-5.49	-9.83	-9.83	-	-	0	-16.1	56.29
M-1	Point	1815.25	224.5	422.48	250	149.1	-76.18	-2.06	-7.37	-10.77	-10.77	-	-	0	-8.6	44.13
M-1	Point	1815.25	224.5	422.48	500	160	-76.18	-5.08	-3.29	-17.76	-17.76	-	-	0	-3.2	54.49
M-1	Point	1815.25	224.5	422.48	1000	158.7	-76.18	-9.04	1.19	-24.01	-24.01	-	-	0	0	50.67
M-1	Point	1815.25	224.5	422.48	2000	155.2	-76.18	-16.37	1.75	-25	-25	-	-	0	1.2	40.6
M-1	Point	1815.25	224.5	422.48	4000	151.9	-76.18	-41.59	1.75	-25	-25	-	-	0	1	11.88
M-1	Point	1815.25	224.5	422.48	8000	147.6	-76.18	-139.09	1.75	-25	-25	-	-	0	-1.1	-92.02
M-1	Point	1815.25	224.5	422.48	16000	144.9	-76.18	-501.45	1.75	-25	-25	-	-	0	-6.6	-462.58
M-3	Point	2355.21	204.5	422.48	31.5	179.1	-78.44	-0.05	5.87	-4.96	-4.96	-	-	0	-39.4	62.12
M-3	Point	2355.21	204.5	422.48	63	175.3	-78.44	-0.21	5.87	-5.13	-5.13	-	-	0	-26.2	71.18
M-3	Point	2355.21	204.5	422.48	125	164.5	-78.44	-0.8	-5.48	0	0.02	-	-	0	-16.1	63.68
M-3	Point	2355.21	204.5	422.48	250	149.1	-78.44	-2.67	-7.36	0	1.3	-	-	0	-8.6	52.04
M-3	Point	2355.21	204.5	422.48	500	160	-78.44	-6.59	-3.28	-3.77	-3.77	-	-	0	-3.2	64.72
M-3	Point	2355.21	204.5	422.48	1000	158.7	-78.44	-11.72	1.2	-8.54	-8.54	-	-	0	0	61.2
M-3	Point	2355.21	204.5	422.48	2000	155.2	-78.44	-21.24	1.76	-10.52	-10.52	-	-	0	1.2	47.96
M-3	Point	2355.21	204.5	422.48	4000	151.9	-78.44	-53.96	1.76	-12.91	-12.91	-	-	0	1	9.35
M-3	Point	2355.21	204.5	422.48	8000	147.6	-78.44	-180.46	1.76	-15.58	-15.58	-	-	0	-1.1	-126.21
M-3	Point	2355.21	204.5	422.48	16000	144.9	-78.44	-650.6	1.76	-18.4	-18.4	-	-	0	-6.6	-607.39
M-2	Point	3025.51	223.45	422.48	31.5	179.1	-80.62	-0.07	5.9	-4.81	-4.81	-	-	0	-39.4	60.1
M-2	Point	3025.51	223.45	422.48	63	175.3	-80.62	-0.27	5.9	-4.86	-4.86	-	-	0	-26.2	69.25
M-2	Point	3025.51	223.45	422.48	125	164.5	-80.62	-1.03	-5.47	0	0.53	-	-	0	-16.1	61.29
M-2	Point	3025.51	223.45	422.48	250	149.1	-80.62	-3.43	-7.35	0	2.24	-	-	0	-8.6	49.11
M-2	Point	3025.51	223.45	422.48	500	160	-80.62	-8.47	-3.27	-2.16	-2.16	-	-	0	-3.2	62.29
M-2	Point	3025.51	223.45	422.48	1000	158.7	-80.62	-15.06	1.21	-5.99	-5.99	-	-	0	0	58.24
M-2	Point	3025.51	223.45	422.48	2000	155.2	-80.62	-27.28	1.77	-6.94	-6.94	-	-	0	1.2	43.33
M-2	Point	3025.51	223.45	422.48	4000	151.9	-80.62	-69.32	1.77	-8.38	-8.38	-	-	0	1	-3.65
M-2	Point	3025.51	223.45	422.48	8000	147.6	-80.62	-231.82	1.77	-10.33	-10.33	-	-	0	-1.1	-174.49
M-2	Point	3025.51	223.45	422.48	16000	144.9	-80.62	-835.77	1.77	-12.69	-12.69	-	-	0	-6.6	-789.01
M-4	Point	1496.32	461.64	422.48	31.5	179.1	-74.6	-0.03	5.79	-4.77	-4.77	-	-	0	-39.4	66.08
M-4	Point	1496.32	461.64	422.48	63	175.3	-74.6	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	75.38
M-4	Point	1496.32	461.64	422.48	125	164.5	-74.6	-0.51	-5.49	0	0.72	-	-	0	-16.1	67.79
M-4	Point	1496.32	461.64	422.48	250	149.1	-74.6	-1.71	-7.38	0	2.61	-	-	0	-8.6	56.8
M-4	Point	1496.32	461.64	422.48	500	160	-74.6	-4.24	-3.3	-1.47	-1.47	-	-	0	-3.2	73.19
M-4	Point	1496.32	461.64	422.48	1000	158.7	-74.6	-7.54	1.18	-4.77	-4.77	-	-	0	0	72.97
M-4	Point	1496.32	461.64	422.48	2000	155.2	-74.6	-13.65	1.74	-4.77	-4.77	-	-	0	1.2	65.11
M-4	Point	1496.32	461.64	422.48	4000	151.9	-74.6	-34.7	1.74	-4.77	-4.77	-	-	0	1	40.57
M-4	Point	1496.32	461.64	422.48	8000	147.6	-74.6	-116.03	1.74	-4.77	-4.77	-	-	0	-1.1	-47.17
M-4	Point	1496.32	461.64	422.48	16000	144.9	-74.6	-418.32	1.74	-4.77	-4.77	-	-	0	-6.6	-357.66

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5

Point Sources	x	y	Height	Lw	Hz	
Point	223773.84	-610840.15	2	179.1	31.5	
-	-	-	-	175.3	63	
-	-	-	-	164.5	125	
-	-	-	-	149.1	250	
-	-	-	-	160	500	
-	-	-	-	158.7	1000	
-	-	-	-	155.2	2000	
-	-	-	-	151.9	4000	
-	-	-	-	147.6	8000	
-	-	-	-	144.9	16000	

Ground Height Points	x	y	Height
-	224184.6	-610862.89	476
-	222718.9	-610748.33	453

Ground Height Lines	x	y	Height
-	228142.27	-608184.3	163
-	228096.44	-607996.43	
-	228056.79	-608030.11	
-	227867.84	-607998.96	
-	227783.14	-607962.9	
-	227764.98	-607900.76	
-	227725.83	-607855.82	
-	227677.51	-607934.28	
-	227572.23	-607992.12	
-	227490.28	-607963.37	
-	227517.44	-608042.55	
-	227477.91	-608065.46	
-	227447.82	-608137.86	
-	227408	-608177.63	
-	227415.31	-608225.32	
-	227457.18	-608263.06	
-	227430.8	-608338.26	
-	227439.32	-608450.77	
-	227409.06	-608466.02	
-	227353.72	-608437.72	
-	227305.09	-608437.79	
-	227201.5	-608493.14	
-	227106.6	-608576.84	
-	227082.01	-608643.83	
-	227030.78	-608706.72	
-	227038.67	-608726.57	
-	227021.11	-608726.27	
-	227054.22	-608829.54	
-	227015.64	-608961.29	
-	227032.62	-609000.13	
-	227057.38	-608891.54	
-	227130.55	-608863.14	
-	227152.94	-608822.53	
-	227185.04	-608807.35	
-	227212.25	-608705.02	
-	227319.14	-608661.01	
-	227337.98	-608544.23	
-	227430.26	-608523.48	
-	227522.52	-608458.37	
-	227606.82	-608498.99	
-	227636.3	-608539.75	
-	227685.57	-608552.53	
-	227688.31	-608534.96	
-	227790.68	-608484.91	
-	227767.27	-608445.41	
-	227773.37	-608410.63	
-	227868.15	-608303.31	
-	227949.96	-608324.38	
-	228023.19	-608388.42	
-	228029.94	-608494.48	
-	227931.78	-608569.37	
-	227844.56	-608535.21	
-	227817.03	-608543.98	
-	227865.26	-608607.17	
-	227833.36	-608634.03	
-	227804.45	-608732.23	
-	227733.99	-608740.36	
-	227729.55	-608768.11	
-	227761.48	-608809.68	
-	227794.51	-608813.37	
-	227804.09	-608885.23	
-	227843.99	-608932.05	
-	227831.88	-608965.5	
-	227921.87	-609211.3	
-	227984.49	-609287.66	
-	228048.91	-609428.08	
-	228151.41	-609532.15	
-	227260.69	-607809.32	183
-	227311.24	-608138.23	
-	227279.14	-608153.11	
-	227254.39	-608204.36	
-	227262.83	-608268.03	
-	227238.11	-608314.99	
-	227178.53	-608330.95	
-	227085.5	-608318.68	
-	227039.96	-608355.98	
-	226995.68	-608440.99	
-	226973.92	-608443.69	
-	226978.02	-608512.55	
-	226950.28	-608616.84	
-	226898.54	-608682.59	
-	226850.94	-608681.11	
-	226938.35	-608743.66	
-	226947.62	-608783.83	
-	226935.04	-608824.1	

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-	225119.73	-608507.31		
-	225134.95	-608441.32		
-	225182.75	-608411.97		
-	225163.89	-608366.53		
-	225194.88	-608367.13		
-	225182.68	-608348.88		
-	225130.32	-608341.79		
-	225124.81	-608297.29		
-	225089.25	-608287.85		
-	225105.32	-608223.98		
-	225077.48	-608184.5		
-	225088.31	-608163.2		
-	225049	-608148.47		
-	225058.81	-608100.22		
-	225004.27	-607949.81		
-	225010.05	-607870.01		
-	224955.79	-607824.96		
-	225002.6	-607803.02		
-	224984.83	-607785.77		
-	225023.99	-607763.42		
-	225016.08	-607743.33		
-	225059.23	-607739.07		
-	225080.16	-607635.31		
-	225007.48	-607591.33		
-	224980.32	-607618.9		
-	224952.58	-607616.04		
-	224999.92	-607516.85		
-	225057.47	-607531.75		
-	225027.71	-607507.07		
-	225101.43	-607408.05		
-	225138.71	-607443.02		
-	225164.06	-607438.29		
-	225172.47	-607353.84		
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-	219363.94	-611062.89			
-	219394.69	-611071.96			
-	219504.52	-611264.48			
-	219739.23	-611397.04			
-	219840.32	-611503.88			
-	219383.24	-611503.74			
-	219483.06	-611508.25			
-	219545.43	-611537.27			
-	219493.09	-611556.64			
-	219446.76	-611614.35			
-	219341.72	-611683.97			
-	219296.47	-611786.64			
-	219242.18	-611099.72			
-	219213.95	-611142.17			
-	219208.63	-611136.87			
-	219180.36	-611177.84			
-	219176.68	-611220.34			
-	219199.49	-611234.04			
-	219265.4	-611179.34			
-	219263.49	-611162.19			
-	219325.96	-611153.24			
-	219406.48	-611229.16			
-	219409.13	-611299.38			
-	219453.09	-611371.33			
-	219513.07	-611406.93			
-	219611.17	-611407.88			
-	219671.57	-611436.31			
-	219786.08	-611552.36			
-	219908.47	-611603.26			
-	219937.94	-611656.12			
-	219958.08	-611643.53			
-	220034.53	-611759.53			
-	220033.68	-611833.13			
-	219938.97	-611868.53			
-	219925.3	-611893.28			
-	219933.77	-61204 8.9			
-	219851.83	-612085.81			
-	219796.76	-612247.14			
-	219692.66	-612286.21			
-	219686.74	-612305.29			
-	219724.49	-612353.89			
-	217224.15	-608648.5	583		
-	218319.01	-608882			
-	221836.83	-608980.27			
-	222000.44	-608974.41			
-	221110.56	-609107.71			
-	221133.06	-609193.08			
-	221120.83	-609270.81			
-	220088.87	-609351.56			
-	220235.26	-609383			
-	218274.05	-609417.16			
-	215599.29	-609394.73			
-	215121.13	-609329.18			
-	214436.13	-609176.77			

548

-	219672.8	-6094 64.48		
-	219415.33	-609397.83		
-	219324.19	-609464.16		
-	219147.6	-609530.73		
-	219150.65	-609996.97	623	
-	219272.33	-610005.49		
-	219378.71	-610100.36		
-	219406.59	-610183.93		
-	219367.64	-61034 9		
-	219156.75	-610649.35		
-	216892.64	-608892.94	623	
-	218353.37	-609128.27		
-	219770.69	-60909 1		
-	220050.7	-609141.34		
-	220076.13	-609217.87		
-	220056.45	-609282.56		
-	22021.8	-609298.13		
-	217060.52	-609251.23		
-	217010.28	-609303.24		
-	216370.53	-609315.87		
-	215630.79	-609274.94		
-	215500.66	-609183.97		
-	214660.01	-609075.86		
-	215010.38	-608921.41		
-	214660.74	-608970		
-	215820.61	-608883.24		
-	215600.65	-608861.21		
-	215700.78	-608821.26		
-	216310.81	-608761.97		
-	216950.83	-608767.95		
-	217220.58	-608802.84		
-	217150.06	-608875.81		
-	224830.57	-609083.38	623	
-	222050.9	-609211.69		
-	222020.77	-609262.53		
-	222440.42	-609276.84		
-	222370.01	-609233.01		
-	222130.98	-609198.19		
-	222250.94	-609169.27		
-	222430.8	-609079.85		
-	219150.79	-611444.77	643	
-	219250.91	-611497.14		
-	219370.11	-611619.87		
-	219450.25	-611635.49		
-	219503.3	-611610.16		
-	219560.46	-611626.64		
-	219700.44	-611745.46		
-	219733.7	-611824.88		
-	219771.61	-611982.33		
-	219750.52	-612030.09		
-	219650.42	-612136.21		
-	219596.6	-612146.72		
-	219550.32	-612124.33		
-	219522.52	-612177.12		
-	219414.82	-612246.21		
-	219424.21	-612288.77		
-	219460.11	-612314.11		
-	219450.57	-612356.94		

-		219211.83	-609357.7	643
-		219187.03	-609384.92	
-		219147.6	-609391.45	
-		219150.65	-610082.31	643
-		219186.87	-610102.31	
-		219269.52	-610093.01	
-		219304.1	-610151.49	
-		219270.11	-610198.72	
-		219255.41	-610351.08	
-		219153.7	-610531.41	
-		220097.87	-609351.61	643
-		220105.83	-609378.86	
-		220086.84	-609416.04	
-		219994.97	-609453.77	
-		219936.8	-609423.55	
-		219902.69	-609354.66	
-		221508.23	-609083.38	643
-		221485.4	-609020.27	
-		221509.27	-608954.76	
-		221581.37	-608901.92	
-		221630.31	-608899.17	
-		221717.08	-608979.75	
-		221769.54	-609090.66	
-		221774.95	-609162.91	
-		221713.17	-609226.8	
-		221619.53	-609256.99	
-		221573.94	-609148.2	
-		219159.79	-611493.89	663
-		219214.44	-611515.31	
-		219380.32	-611680.76	
-		219498.44	-611649.83	
-		219649.14	-611721.69	
-		219729.71	-611954.59	
-		219721.21	-612018.04	
-		219683.36	-612067.78	
-		219595.88	-612087.72	
-		219515.83	-612068.03	
-		219454.87	-612165.57	
-		219315.35	-612271.72	
-		219318.36	-612356.94	
-		219153.7	-610132.63	663
-		219197.95	-610171.54	
-		219184.79	-610296	
-		219153.7	-610357.67	
-		220058.25	-609351.61	663
-		220054.29	-609389.51	
-		219981.88	-609409.55	
-		219949.01	-609390.15	
-		219944.86	-609354.66	
-		221546.95	-609083.38	663
-		221513.84	-609046.61	
-		221510.12	-608992.36	
-		221622.73	-608914.45	
-		221684.84	-608975.09	
-		221740.36	-609112.59	
-		221707.26	-609153.88	
-		221645.02	-609160.4	
-		219159.79	-611543.96	683
-		219200.35	-611540.97	
-		219262.84	-611640.01	
-		219370.85	-611716.83	
-		219480.13	-611691.62	
-		219598.7	-611723.01	
-		219637.59	-611784.2	
-		219691.64	-611966.77	
-		219659.58	-612022.98	
-		219489.33	-612023.54	
-		219439.58	-612101.51	
-		219305.85	-612207.31	
-		219226.01	-612356.94	
-		219159.79	-611577.57	703
-		219195.32	-611594.59	
-		219264.55	-611686.65	
-		219377.68	-611750.27	
-		219470.87	-611721.86	
-		219568.22	-611753.51	
-		219651.15	-611938.99	
-		219635.29	-611957.63	
-		219462.23	-611972.41	
-		219418.88	-612058.25	
-		219266.53	-612189.36	
-		219230.28	-612295.29	
-		219165.89	-612356.24	
-		219162.84	-611618.51	723
-		219238.66	-611715.76	
-		219378.09	-611774.28	
-		219470.74	-611748.98	
-		219528.44	-611758.58	
-		219557.27	-611789.93	
-		219588.26	-611886.1	
-		219577.59	-611908.8	
-		219446.39	-611905.92	
-		219377.53	-612047.47	
-		219293.05	-612104.46	
-		219165.89	-612265.72	
-		219162.84	-611700.36	743
-		219267.69	-611781.43	
-		219336.58	-611792.65	
-		219393.02	-611860.14	
-		219354.81	-612009.42	
-		219165.89	-612173.36	
-		219162.84	-611751.23	763
-		219323.06	-611872.18	
-		219336.61	-611915.89	
-		219307.18	-612007.58	
-		219165.89	-612123.15	
-		219162.84	-611807.48	783
-		219270.44	-611876.23	
-		219287.85	-611929.63	
-		219266.74	-611988.42	
-		219162.84	-612072.77	
-		219162.84	-611859.33	803
-		219220.49	-611892.1	
-		219231.48	-611930.24	
-		219220.29	-611967.49	
-		219162.84	-612024	
-		223733.07	-610796.57	420
-		223735.15	-610837.38	
-		223715.21	-610861.92	
-		223742.95	-610882.22	
-		223771.02	-610873.83	
-		223798.61	-610864.32	
-		223804.87	-610858.06	
-		223809.74	-610841.82	
-		223812.29	-610827.68	
-		223812.76	-610811.91	
-		223810.9	-610800.55	
-		223808.58	-610789.65	
-		223805.11	-610767.62	
-		223805.34	-610767.62	
-		223734.09	-610868.46	420
-		223763.47	-610853.96	
-		223792.34	-610843.21	
-		223796.22	-610833.83	
-		223799.34	-610840.15	424
-		223793.15	-610857.71	
-		223744.84	-610874.83	

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Ã˚C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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Noise Mapping Results / No Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
M-1	1.5	75.44	64.22	73.15	65.55	54.79	66.99	64.12	52.61	21	-86.65	-463.6
M-2	1.5	71	60.01	69.12	61.24	49.06	61.66	57.2	41.75	-5.92	-177.9	-795.41
M-3	1.5	73.5	62.23	71.3	63.8	52.17	64.98	61.55	48.45	10.25	-123.75	-599.18
M-4	1.5	79.49	66.08	75.38	67.79	56.8	73.18	72.96	65.1	40.56	-47.19	-357.75
M-5	1.5	107.17	88.55	97.93	92.78	77.57	97.51	103.37	100.95	95.19	80.07	39.47

*** Receiver Results - Sources Analysis ***

Receiver Name	Source
M-1 [1.5m]	75.44
M-2 [1.5m]	71
M-3 [1.5m]	73.5
M-4 [1.5m]	79.49
M-5 [1.5m]	107.17

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-1	Source	1815.25	224.5	421.21	31.5	179.1	-76.26	-0.04	5.83	-5	-5	-	-	0	-39.4	64.22
M-1	Source	1815.25	224.5	421.21	63	175.3	-76.26	-0.16	5.83	-5.35	-5.35	-	-	0	-26.2	73.15
M-1	Source	1815.25	224.5	421.21	125	164.5	-76.26	-0.62	-5.49	-0.47	-0.47	-	-	0	-16.1	65.55
M-1	Source	1815.25	224.5	421.21	250	149.1	-76.26	-2.08	-7.37	0	0.41	-	-	0	-8.6	54.79
M-1	Source	1815.25	224.5	421.21	500	160	-76.26	-5.13	-3.29	-5.13	-5.13	-	-	0	-3.2	66.99
M-1	Source	1815.25	224.5	421.21	1000	158.7	-76.26	-9.12	1.19	-10.38	-10.38	-	-	0	0	64.12
M-1	Source	1815.25	224.5	421.21	2000	155.2	-76.26	-16.52	1.75	-12.75	-12.75	-	-	0	1.2	52.61
M-1	Source	1815.25	224.5	421.21	4000	151.9	-76.26	-41.99	1.75	-15.4	-15.4	-	-	0	1	21
M-1	Source	1815.25	224.5	421.21	8000	147.6	-76.26	-140.42	1.75	-18.22	-18.22	-	-	0	-1.1	-86.65
M-1	Source	1815.25	224.5	421.21	16000	144.9	-76.26	-506.25	1.75	-21.13	-21.13	-	-	0	-6.6	-463.6
M-2	Source	3025.51	223.45	421.21	31.5	179.1	-80.65	-0.07	5.9	-4.86	-4.86	-	-	0	-39.4	60.01
M-2	Source	3025.51	223.45	421.21	63	175.3	-80.65	-0.27	5.9	-4.94	-4.94	-	-	0	-26.2	69.12
M-2	Source	3025.51	223.45	421.21	125	164.5	-80.65	-1.03	-5.47	0	0.36	-	-	0	-16.1	61.24
M-2	Source	3025.51	223.45	421.21	250	149.1	-80.65	-3.44	-7.35	0	1.93	-	-	0	-8.6	49.06
M-2	Source	3025.51	223.45	421.21	500	160	-80.65	-8.5	-3.27	-2.71	-2.71	-	-	0	-3.2	61.66
M-2	Source	3025.51	223.45	421.21	1000	158.7	-80.65	-15.13	1.21	-6.93	-6.93	-	-	0	0	57.2
M-2	Source	3025.51	223.45	421.21	2000	155.2	-80.65	-27.4	1.77	-8.36	-8.36	-	-	0	1.2	41.75
M-2	Source	3025.51	223.45	421.21	4000	151.9	-80.65	-69.63	1.77	-10.3	-10.3	-	-	0	1	-5.92
M-2	Source	3025.51	223.45	421.21	8000	147.6	-80.65	-232.86	1.77	-12.66	-12.66	-	-	0	-1.1	-177.9
M-2	Source	3025.51	223.45	421.21	16000	144.9	-80.65	-839.53	1.77	-15.3	-15.3	-	-	0	-6.6	-795.41
M-3	Source	2355.21	204.5	421.21	31.5	179.1	-78.33	-0.05	5.86	-4.95	-4.95	-	-	0	-39.4	62.23
M-3	Source	2355.21	204.5	421.21	63	175.3	-78.33	-0.21	5.86	-5.12	-5.12	-	-	0	-26.2	71.3
M-3	Source	2355.21	204.5	421.21	125	164.5	-78.33	-0.79	-5.48	0	0.04	-	-	0	-16.1	63.8
M-3	Source	2355.21	204.5	421.21	250	149.1	-78.33	-2.63	-7.36	0	1.34	-	-	0	-8.6	52.17
M-3	Source	2355.21	204.5	421.21	500	160	-78.33	-6.51	-3.28	-3.7	-3.7	-	-	0	-3.2	64.98
M-3	Source	2355.21	204.5	421.21	1000	158.7	-78.33	-11.58	1.2	-8.44	-8.44	-	-	0	0	61.55
M-3	Source	2355.21	204.5	421.21	2000	155.2	-78.33	-20.98	1.76	-10.4	-10.4	-	-	0	1.2	48.45
M-3	Source	2355.21	204.5	421.21	4000	151.9	-78.33	-53.3	1.76	-12.77	-12.77	-	-	0	1	10.25
M-3	Source	2355.21	204.5	421.21	8000	147.6	-78.33	-178.26	1.76	-15.42	-15.42	-	-	0	-1.1	-123.75
M-3	Source	2355.21	204.5	421.21	16000	144.9	-78.33	-642.67	1.76	-18.24	-18.24	-	-	0	-6.6	-599.18
M-4	Source	1496.32	461.64	421.21	31.5	179.1	-74.61	-0.03	5.79	-4.77	-4.77	-	-	0	-39.4	66.08
M-4	Source	1496.32	461.64	421.21	63	175.3	-74.61	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	75.38
M-4	Source	1496.32	461.64	421.21	125	164.5	-74.61	-0.51	-5.49	0	0.72	-	-	0	-16.1	67.79
M-4	Source	1496.32	461.64	421.21	250	149.1	-74.61	-1.72	-7.38	0	2.61	-	-	0	-8.6	56.8
M-4	Source	1496.32	461.64	421.21	500	160	-74.61	-4.24	-3.3	-1.47	-1.47	-	-	0	-3.2	73.18
M-4	Source	1496.32	461.64	421.21	1000	158.7	-74.61	-7.54	1.18	-4.77	-4.77	-	-	0	0	72.96
M-4	Source	1496.32	461.64	421.21	2000	155.2	-74.61	-13.66	1.74	-4.77	-4.77	-	-	0	1.2	65.1
M-4	Source	1496.32	461.64	421.21	4000	151.9	-74.61	-34.7	1.74	-4.77	-4.77	-	-	0	1	40.56
M-4	Source	1496.32	461.64	421.21	8000	147.6	-74.61	-116.05	1.74	-4.77	-4.77	-	-	0	-1.1	-47.19
M-4	Source	1496.32	461.64	421.21	16000	144.9	-74.61	-418.41	1.74	-4.77	-4.77	-	-	0	-6.6	-357.75
M-5	Source	169.84	419.14	421.21	31.5	179.1	-55.21	0	4.06	0	-	-	-	0	-39.4	88.55
M-5	Source	169.84	419.14	421.21	63	175.3	-55.21	-0.01	4.06	0	-	-	-	0	-26.2	97.93
M-5	Source	169.84	419.14	421.21	125	164.5	-55.21	-0.06	-0.36	0	-	-	-	0	-16.1	92.78
M-5	Source	169.84	419.14	421.21	250	149.1	-55.21	-0.18	-7.54	0	-	-	-	0	-8.6	77.57
M-5	Source	169.84	419.14	421.21	500	160	-55.21	-0.45	-3.62	0	-	-	-	0	-3.2	97.51
M-5	Source	169.84	419.14	421.21	1000	158.7	-55.21	-0.81	0.68	0	-	-	-	0	0	103.37
M-5	Source	169.84	419.14	421.21	2000	155.2	-55.21	-1.46	1.22	0	-	-	-	0	1.2	100.95
M-5	Source	169.84	419.14	421.21	4000	151.9	-55.21	-3.72	1.22	0	-	-	-	0	1	95.19
M-5	Source	169.84	419.14	421.21	8000	147.6	-55.21	-12.44	1.22	0	-	-	-	0	-1.1	80.07
M-5	Source	169.84	419.14	421.21	16000	144.9	-55.21	-44.84	1.22	0	-	-	-	0	-6.6	39.47

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5

Point Sources	x	y	Height	Lw	Hz
Source	110.34	-11.5	2	179.1	31.5
-	-	-		175.3	63
-	-	-		164.5	125
-	-	-		149.1	250
-	-	-		160	500
-	-	-		158.7	1000
-	-	-		155.2	2000
-	-	-		151.9	4000
-	-	-		147.6	8000
-	-	-		144.9	16000

Ground Height Points	x	y	Height
-	134.08	295.24	480
-	514.08	-44.76	475

Ground Height Lines	x	y	Height
-	4476.27	2642.71	163
-	4430.44	2830.57	
-	4390.79	2796.89	
-	4201.84	2828.04	
-	4117.14	2864.1	
-	4098.98	2926.24	
-	4059.83	2971.18	
-	4011.51	2892.73	
-	3906.23	2834.88	
-	3824.28	2863.63	
-	3851.44	2784.45	
-	3811.91	2761.54	
-	3781.83	2689.14	
-	3742	2649.37	
-	3749.31	2601.68	
-	3791.18	2563.94	
-	3764.8	2488.74	
-	3773.32	2376.23	
-	3743.06	2360.98	
-	3687.72	2389.28	
-	3639.09	2389.21	
-	3535.5	2333.86	
-	3440.6	2250.16	
-	3416.01	2183.17	
-	3364.78	2120.28	
-	3372.67	2100.43	
-	3355.11	2100.73	
-	3388.22	1997.46	
-	3349.65	1865.71	
-	3366.62	1826.87	
-	3391.38	1935.46	
-	3464.55	1963.86	
-	3486.94	2004.47	
-	3519.04	2019.65	
-	3546.25	2121.98	
-	3653.14	2165.99	
-	3671.98	2282.77	
-	3764.26	2303.52	
-	3856.52	2368.63	
-	3940.82	2328.01	
-	3970.3	2287.25	
-	4019.57	2274.47	
-	4022.31	2292.04	
-	4124.68	2342.09	
-	4101.27	2381.59	
-	4107.37	2416.37	
-	4202.15	2523.69	
-	4283.96	2502.63	
-	4357.19	2438.58	
-	4363.94	2332.52	
-	4265.78	2257.63	
-	4178.56	2291.79	
-	4151.03	2283.02	
-	4199.26	2219.83	
-	4167.36	2192.97	
-	4138.45	2094.77	
-	4067.99	2086.64	
-	4063.55	2058.89	
-	4095.48	2017.32	
-	4128.51	2013.63	
-	4138.09	1941.77	
-	4178	1894.95	
-	4165.88	1861.5	
-	4255.87	1615.7	
-	4318.49	1539.34	
-	4382.92	1398.92	
-	4485.41	1294.85	
-	3594.69	3017.68	183
-	3645.24	2688.77	
-	3613.14	2673.89	
-	3588.39	2622.64	
-	3596.83	2558.97	
-	3572.11	2512.01	
-	3512.54	2496.05	
-	3419.5	2508.32	
-	3373.96	2471.03	
-	3329.68	2386.01	
-	3307.92	2383.31	
-	3312.02	2314.45	
-	3284.28	2210.16	
-	3232.54	2144.41	
-	3184.94	2145.89	
-	3272.35	2083.34	
-	3281.62	2043.17	
-	3269.04	2002.9	
-	3244.3	1991.11	
-	3235.51	1914.5	
-	3207.34	1915.27	
-	3195.96	1871.49	
-	3135.62	1808.15	
-	3165.66	1804.61	
-	3144.44	1776.45	
-	3162.67	1743.88	
-	3083.12	1685.93	
-	3063.16	1693.4	
-	2964.53	1640.22	
-	2870.85	1648.8	
-	2830.17	1605.47	
-	2799.61	1632.88	
-	2750.73	1633.43	
-	2728.07	1601.99	
-	2736.24	1570.55	
-	2717.33	1576.64	
-	2772.53	1483.59	
-	2770.73	1356.54	
-	2786.68	1338.7	
-	2824.25	1350.47	
-	2866.72	1329.11	
-	2896.16	1243.66	
-	2888.14	1125.91	
-	2923.34	1077.52	
-	2956.56	955.85	
-	2996.48	884.09	
-	3106	804.81	
-	3159.44	791.41	
-	3258.78	824.31	
-	3300.04	766.56	
-	3308.9	780.48	
-	3309.72	645.39	
-	3211.17	593.27	
-	3183.95	552.44	
-	3192.45	512.32	
-	3233.64	466.61	
-	3233.39	431.04	
-	3247.93	445.2	
-	3306.57	429.55	
-	3296.6	456.5	

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-	3314.19	464.32		
-	3272.53	524.22		
-	3289.52	507.2		
-	3327.76	570.78		
-	3426.14	650.88		
-	3459.02	713.82		
-	3478.57	818.24		
-	3469.96	930.75		
-	3492.7	1027.54		
-	3535.9	1105.11		
-	3512.35	1196.06		
-	3559.09	1259.78		
-	3574.64	1319.83		
-	3538.39	1332.32		
-	3522.64	1284.06		
-	3496.08	1276.34		
-	3342.46	1359.41		
-	3308.89	1402.24		
-	3363.1	1549.61		
-	3364.78	1632.65		
-	3417.19	1713.09		
-	3405.82	1831.54		
-	3506.53	1944.13		
-	3567.49	2087.38		
-	3675.23	2146.6		
-	3699.02	2212.77		
-	3727.21	1934.65		
-	3742.56	1957.08		
-	3753.32	1942.74		
-	3763.88	2097.35		
-	3802.63	1954.75		
-	3811.73	1981.13		
-	3823.85	1964		
-	3805.88	2268.86		
-	3887.74	2241.66		
-	3899.55	2191.91		
-	3951.71	2185.71		
-	4028.1	2103.3		
-	4037.71	2028.61		
-	4100.34	1975.64		
-	4136.68	1889.99		
-	4108.07	1849.28		
-	4152.96	1821.6		
-	4224.07	1612.55		
-	4299.42	1518.06		
-	4341.39	1399.19		
-	4438.56	1271.46		
-	4485.41	1173.86		
-	4491.51	94.57	183	
-	4491.51	79.63		
-	4473.22	2998.58	183	
-	4431.61	2980.04		
-	4390.07	2913.96		
-	4202.89	2907.86		
-	4159.14	2935.69		
-	4104.34	3020.73		
-	4321.04	3023.78	183	
-	4378.05	2984.28		
-	4417.29	2991.32		
-	4439.62	3023.78		
-	1000.84	4502.06	203	
-	954.84	4439.32		
-	960.21	4413.69		
-	991.32	4408.65		
-	1061.56	4486.92		
-	1075.41	4456.85		
-	1026.49	4400.39		
-	1068.37	4386.16		
-	1036.16	4363.81		
-	1041.26	4335.29		
-	1008.27	4260.53		
-	961.91	4233.87		
-	906.99	4243.27		
-	915.7	4317.14		
-	892.65	4324.26		
-	888.74	4354.41		
-	822.78	4327.26		
-	776.27	4159.86		
-	749.64	3861.98		
-	815.66	3822.36		
-	778.52	3827.98		
-	778.04	3810.67		
-	819.16	3804.57		
-	910.08	3857.41		
-	940.68	3852.52		
-	949.03	3813.37		
-	959.1	3867.85		
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-	991.39	3820.65		
-	1022.9	3777.99		
-	1050.36	3788.82		
-	1044.76	3740.2		
-	1107.14	3750.28		
-	1100.79	3779.66		
-	1080.47	3767.72		
-	1065.77	3791.68		
-	1128.82	3847.37		
-	1168.94	3842.08		
-	1192.99	3736.75		
-	1223.21	3734.98		
-	1242.64	3674.62		
-	1309.49	3611.09		
-	1266.82	3514.23		
-	1245.85	3530.27		
-	1265.72	3457.1		
-	1349.42	3503.21		
-	1418.05	3482.05		
-	1430.86	3532.15		
-	1479	3591.78		
-	1479.68	3629.64		
-	1516.72	3669.66		
-	1504.93	3635.44		
-	1532.42	3633.49		
-	1532.37	3565.33		
-	1562.81	3528.73		
-	1506.47	3473.16		
-	1547.35	-1594.94		
-	2644.1	-969.01		
-	2562.34	-1094.28		
-	2499.39	-1249.18		
-	2484.78	-1264.12		
-	2471.18	-1245.98		
-	2513.44	-1166.37		
-	2498.61	-1139.3		
-	2517.47	-1079.9		
-	2547.95	-1012.85		
-	2568.26	-1008.49		
-	2571.74	-928.96		
-	2626.05	-841.04		
-	2636.66	-749.58		
-	2568.32	-567.09		
-	2544.34	-558.63		
-	2574.31	-552.61		
-	2598.75	-578.76		
-	2562.19	-329.3		
-	2549.82	-352.74		
-	2561.68	-402.68		
-	2510.3	-246.63		
-	2552.83	-460.64		
-	2538.28	-475.19		
-	2501.66	-424.52		
-	2516.46	-396.37		
-	2501.09	-390.22		
-	2488.99	-409.97		
-	2462.01	-351.35		
-	2491.94	-310.68		
-	2488.76	-286.33		
-	2374.49	-170.51		
-	2361.46	-131.91		
-	2365.07	-98.45		
-	2440.64	-84.52		
-	2443.32	5.37		
-	2470.66	-48.69		
-	2427.84	134.27		
-	2416.05	140.13		
-	2415.84	114.28		
-	2359.68	179.73		
-	2352.67	250.18		
-	2294.13	240.72		
-	2275.14	145.94		
-	2233.53	78.81		
-	2187.78	117.94		
-	2214.74	137.34		
-	2192.48	214.73		
-	2223.56	222.89		
-	2284.93	319.48		
-	2260.09	381.21		
-	2210.7	372.6		

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203 203 203 203 203 203 203 203

-1592.87 -1513.5 -1414.66 -1408.83 -1461.82 -1070.05 -1430.61 -1232.03 -1225.03 -1232.38 -1284.06 -1319.6 -1468.48 -1430.5 -1547.73 -1598.93 -1456.44 -1577.84 -1598.07 -1582.43 -1598.83 -1615.26 -1663.85 -1697.57 -1737.92 -1831.76 -1880.05 -1886.42 -1903.47 -2017.32 -2000.84 -2099.61 -2114.81 -2137.73 -2191.66 -2107.08 -2146.71 -2169.16 -2181.46 -2271.67 -2488.93 -2331.79 -2317.26 -2331.07 -2337.38 -2329.49 -2273.28 -2345.21 -2258.42 -2373.85 -2404.22 -2301.78 -2301.14 -2321.36 -2266.88 -2301.83 -2076.55 -1908.76 -1996.23 -1928.85 -1899.93 -1859.78 -1859.12 -1805.13 -1797.11 -1767.7 -1755.51 -1736.43 -1618.69 -1604.61 -1618.38 -1573.47 -1561.25 -1511.6 -1558.32 -1643.29 -1614.67 -1598.95 -1638.4 -1633.99 -1622.37 -1600.17 -1643.07 -1617.57 -1351.155 -791.65 -908.36 -828.88 -700.73 -641.37 -690.03 -482.49 -371.28 -432.59 -392.79 -396.79 -373.92 -373.83 -198.07 -126.28 -42.3 -87.7 219.07 274.58 193.45 122.1 38.74 -126.77 -150.66 -94.41 -99.37 -45.73 -60.28 -1095.02 -1911.21 -1910.66 -1755.85 -1755.15 -1765.73 -1844.86 -1883.51 -1903.23 -1913.15 -1924.38 -2226.14 -1134.03 -1067.96 -974.94 -1923.06 -1906.36 -1908.2 -1844.12 -1861.98 -1869.87 -1870.06 -1876.63 -1842.25 -1844.65 -1644.77 -1375.18 -1360.66 -261.97 -265.34 -250.32 -213.18 -175.68 -54.6 -107.47 -125.81 -139.74 -179.13 -174.61 -1794.44 -1872.59 -1891.65 -1911.34 -1979.68 -1968.85 -1931.77 -1762.14 -4059.99 -3980.75 -3944.13 -3924.44 -3938.18 -4037.18 -4080.55 -4087.52 -4059.3 -4111.69 -4105.11 -4232.88 -4296.83 -4298.03 -4069.3 -4069.14 -4095.82 -4136.39 -4183.93 -4196.77 -4244.83 -4191.36 -4188.54 -4190.44 -4250.42 -4249.84 -4374.93 -4305.11 -4317.68 -4307.68 -2750.31 -2717.82 -2618.56 -2562.26 -2549.92 -2618.49 -2618.49 -2633.49 -2577.24 -2629.78 -2622.29 -2657.88 -2651.45 -2631.11 -2615.14 -2662.45 -2668.43 -2468.85 -2480.1 -2499.02 -2483.23 -2484.49 -2520.55 -2556.08 -2556.62 -2584.71 -2557.85 -2551.33 -2511.76 -2507.23 -2536.39 -2576.26 -2626.46 -2657.52 -2657.45 -2653.3 -2667.14 -2706.07

553

-	1577.75	-399.26		
-	1629.5	-403.91		
-	1641.72	-386.08		
-	1601.5	-292.95		
-	1632.47	-322.98		
-	1649.77	-307.19		
-	1692.44	-376.96		
-	1714.78	-360.58		
-	1721.15	-383.95		
-	1769.62	-411.26		
-	1822.52	-354.48		
-	1866.97	-341.04		
-	1876.11	-301.57		
-	1845.63	-219.28		
-	1818.55	-209.61		
-	1857.98	-79.35		
-	1847.98	-56.56		
-	1952.64	88.44		
-	1983.2	104.87		
-	2059.95	102.93		
-	2084.48	184.91		
-	2114.78	207.88		
-	2104.29	223.18		
-	2018.8	167.94		
-	2071.48	360.69		
-	2074.22	390.61		
-	2058.81	391.24		
-	2076.07	565.48		
-	2126.73	785.66		
-	2093.72	1141.75		
-	2109.3	1211.89		
-	2081.25	1323.1		
-	1999.58	1447.98		
-	1988.56	1510.19		
-	1951.69	1564.78		
-	1831.14	1681.37		
-	1668.75	1883.91		
-	1588.46	1918.48		
-	1553.25	1909.56		
-	1507.51	1987.5		
-	1467.52	2006.67		
-	1379.24	2116.28		
-	1340.18	2136.77		
-	1309.46	2117.23		
-	1220.17	2345.08		
-	1184.73	2377.38		
-	1163.63	2365.55		
-	1115.19	2380.74		
-	964.66	2140.27		
-	955.6	2009.6		
-	875.44	1825.84		
-	854.25	1709.91		
-	865.8	1601.97		
-	832.95	1418.75		
-	850.45	1399.32		
-	837.26	1361.05		
-	881.13	1332.33		
-	807.23	1326.28		
-	788.14	1304.46		
-	803.28	1279.78		
-	791.13	1223.35		
-	830.71	1121.28		
-	831.03	835.01		
-	860.73	802.74		
-	869.4	729.71		
-	736.4	906.72		
-	705.99	997.45		
-	694.1	1253.08		
-	653.47	1292.42		
-	645.29	1401.18		
-	576.54	1568.25		
-	580.04	1722.02		
-	606.56	1743.4		
-	619.07	1816.75		
-	570.9	1880.47		
-	592.59	1966.86		
-	626.27	2003.53		
-	623.31	2122.64		
-	581.55	2221.18		
-	572.22	2300.3		
-	543.89	2320.82		
-	541.15	2360.56		
-	496.04	2382.9		
-	495.62	2535.18		
-	453.4	2635.68		
-	477.33	2664.11		
-	457.99	2665.41		
-	465.19	2721.08		
-	432.03	2751.7		
-	437.46	2792.15		
-	381.79	2774.35		
-	334.18	2820.11		
-	443.61	2842.4		
-	445.87	2890.9		
-	477.32	2907.97		
-	469.17	2934.1		
-	513.63	2963.05		
-	499.12	3005.99		
-	535.29	3106.93		
-	529.97	3133.6		
-	512.15	3093.91		
-	526.11	3188.09		
-	461.74	3255.52		
-	399.65	3270.97		
-	342.87	3350		
-	303.86	3361.88		
-	262.2	3348.62		
-	209.56	3370.25		
-	236.33	3371.39		
-	248.78	3393.44		
-	228.13	3412.92		
-	254.88	3442.22		
-	237.18	3471.69		
-	285.83	3458.87		
-	324.57	3398.72		
-	382.84	3386.73		
-	428.02	3413.42		
-	467.27	3398.6		
-	480.42	3414.78		
-	489.57	3458.7		
-	475.86	3474.62		
-	367.43	3470.52		
-	355.52	3492.47		
-	440.47	3526.66		
-	428.8	3681.32		
-	478.23	3760.17		
-	475.08	3791.88		
-	492.52	3788.79		
-	565.43	3886.32		
-	583.32	3981.88		
-	625.35	4038.65		
-	620.68	4153.9		
-	651.11	4237.74		
-	629.84	4283.15		
-	635.93	4394.68		
-	661.6	4444.23		
-	641.8	4471.35		
-	617.52	4442.44		
-	596.38	4502.06	223	
-	627.26	4514.25		
-	725.63	4490.95		
-	659.88	4514.25	203	
-	580.34	4514.25		
-	571.49	4514.25	203	
-	232.86	4511.21		
-	208.77	4511.21	203	
-	108.71	2044.54		
-	990.41	2089.45		
-	939.91	1992.71		
-	939.98	1933.54		
-	965.5	1901.72		
-	024.56	1895.93		
-	090.09	1947.06		
-	104.04	1997.14		
-	141.35	1981.36	203	
-	721.92	2184.5		
-	695.05	2152.98		
-	573.05	2150.08		
-	531.04	2115.12		
-	565.15	2078.93		
-	657.61	2130.21		
-	822.41	2056.94		
-	864.59	2060		
-	863.87	2084.96		
-	827.3	2103.93	203	
-	208.48	4511.21		
-	177.98	4492.05		
-	200.76	4456.59		
-	278.66	4470.49		
-	269.66	4446.9		
-	294.2	4419.68		
-	358.85	4395.28		
-	370.12	4406.22		
-	492.3	4329.17		
-	589.53	4381.85		
-	588.68	4292.89		
-	647.36	4248.41		
-	679.14	4248.17		
-	709.42	4275.23		
-	747.84	4392.35		
-	580.63	4514.25	203	
-	425.11	2088.58		
-	427.16	2176.15		
-	384.67	2235.4		
-	275.72	2326.46		
-	242.75	2317.08		
-	284.82	2199.58		
-	372.14	2107.16		
-	423.62	2088.02		
-	417.36	2062.22		
-	442.94	2036.45		
-	451.45	2052.41	203	
-	653.49	4514.25		
-	684.02	4483.98		
-	733.8	4486.35		
-	761.95	4462.42		
-	760.74	4441.6		
-	742.1	4459.11		
-	771.93	4378.1		
-	762.26	4238.18		
-	714.98	4169.37		
-	660.18	4136.77		
-	546.83	4121.2		
-	448.4	4169.93		
-	361.82	4163.83		
-	354.86	4108.87		
-	318.63	4057.69		
-	160.79	4257.4		
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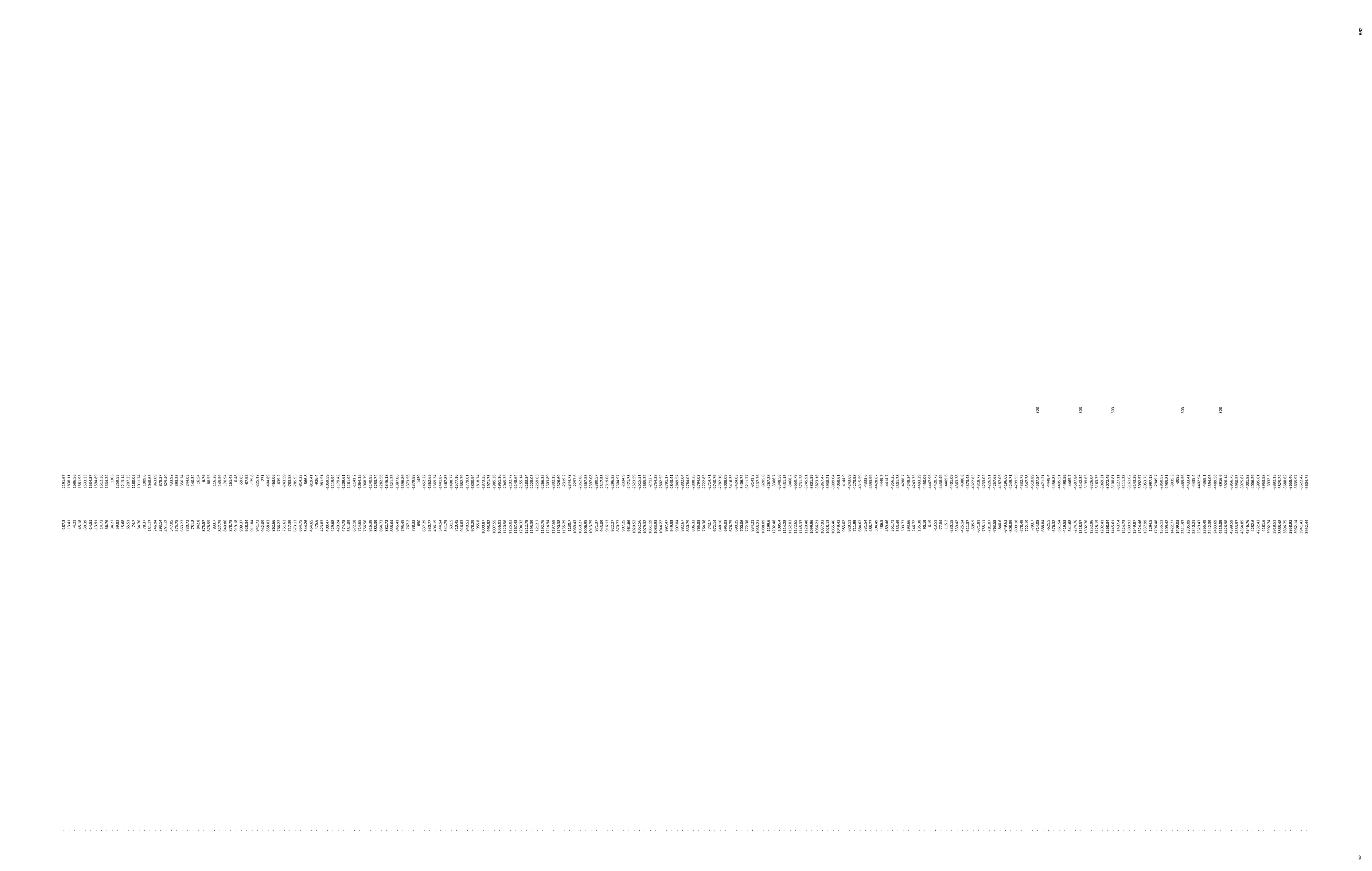
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-	-4403.16	-813.01	
-	-4295.15	-889.83	
-	-4185.87	-864.62	
-	-4067.3	-896.01	
-	-4028.41	-957.2	
-	-3974.36	-1139.77	
-	-4006.41	-1195.98	
-	-4176.67	-1196.54	
-	-4226.42	-1274.51	
-	-4360.15	-1380.31	
-	-4439.99	-1529.94	
-	-4506.2	-750.57	703
-	-4470.68	-767.59	
-	-4401.45	-859.65	
-	-4288.32	-923.27	
-	-4195.13	-894.86	
-	-4097.78	-926.5	
-	-4014.85	-1111.99	
-	-4030.71	-1130.63	
-	-4203.77	-1145.41	
-	-4247.12	-1231.25	
-	-4399.47	-1362.36	
-	-4435.72	-1468.29	
-	-4500.11	-1529.23	
-	-4503.16	-791.51	723
-	-4427.34	-888.76	
-	-4287.91	-947.28	
-	-4195.26	-921.98	
-	-4137.56	-931.57	
-	-4108.73	-962.93	
-	-4077.74	-1059.1	
-	-4088.41	-1081.79	
-	-4219.61	-1078.92	
-	-4288.47	-1220.47	
-	-4372.95	-1277.46	
-	-4500.11	-1438.72	
-	-4503.16	-873.36	743
-	-4398.31	-954.43	
-	-4329.42	-965.65	
-	-4272.98	-1033.14	
-	-4311.19	-1182.42	
-	-4500.11	-1346.35	
-	-4503.16	-924.23	763
-	-4342.94	-1045.18	
-	-4329.39	-1088.89	
-	-4358.82	-1180.58	
-	-4500.11	-1296.15	
-	-4503.16	-980.48	783
-	-4395.56	-1049.23	
-	-4378.15	-1102.63	
-	-4399.26	-1161.42	
-	-4503.16	-1245.77	
-	-4503.16	-1032.33	803
-	-4445.51	-1065.1	
-	-4434.52	-1103.24	
-	-4445.71	-1140.49	
-	-4503.16	-1197	

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Â°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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July 2023 Sound Study V September 2023 Sound Study Compare Report

578

12/18/2023 10:38:43 AM

Compare Results

Old File:

2023-7-19_UCI_Sound_Study (2).pdf

72 pages (217.80 MB)

8/1/2023 8:33:30 AM

versus

New File:

2023-9-27 Sound Study_r (1).pdf

165 pages (21.72 MB)

12/15/2023 8:19:07 AM

Total Changes

732

Content

114 Replacements

196 Insertions

28 Deletions

Styling and Annotations

393 Styling

1 Annotation

Go to First Change (page 1)

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SOUND STUDY

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
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Date: December 15, 2023

UNCONVENTIONAL CONCEPTS, INC.

APA PROJECT #2021-0276

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September 2023

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1.0 INTRODUCTION

Unconventional Concepts, Inc. (UCI) has proposed to the Adirondack Park Agency (APA), an application for the operation of a projectile testing range in Lewis, New York. The range (Site) is at 195 Hale Hill Lane (Figure 1). H2H Geoscience Engineering, PLLC (H2H) prepared this report to identify and evaluate the potential impacts of off-site sound propagation from the proposed application. The potential sound impacts associated with the application were assessed in accordance with the requirements set forth by the Adirondack Park Agency (APA) and the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT BACKGROUND

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. The range will be developed to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance.

This effort will focus on the test and evaluation of these new systems in support of a critical US Army research program managed by Benét Laboratories at Watervliet Arsenal in Albany, NY. The project will focus on the instrumentation and firing of these systems in a constrained area to allow for measurement and assessment of the internal ballistics and kinetic and kinematic effects of these modern designs.

All test equipment and instrumentation will be portable; equipment will be deployed as needed to the Site for a test and will then be completely removed at the end of the test.

The testing schedule is as follows:

- A shot will only be fired on weekdays between the hours of 10:00 AM and 4:00 PM.
- A maximum of two shots will be fired in one day.
- Shots will be fired a maximum of three consecutive days.
- Testing is anticipated to continue for a period of five years, with an average of 30 shots per year.

The Site is on land owned by Pulsifer Logging, LLC (38.1-1-31.000). UCI is using the land with the landowner's (written) permission. The Sound Source (155 mm howitzer barrel assembly) will be located on a 100 ft. X 100 ft. crushed gravel pad (Firing Pad). A haul truck will be used to transport the barrel assembly to the firing pad. The Operations Control Area is adjacent to the Firing Pad; the Target Area is 590 ft. east of the Firing Pad (Figure 2). The 155 mm howitzer barrel assembly and the Haul Truck are the only sources of sound that could produce a potential signific environmental impact associated with the project.

The Site is accessed via an access road off Hale Hill Road. The area surrounding the Site is heavily forested with a topographic high to the east and south. NYS Route 9 is located approximately 7,000 ft. to the east. Within a two-mile radius of the site (Project Area) forty-four Residential Receptors (RR) were identified. The closest RR is the Pulsifer residents (R-1) 5,200 ft. to the northeast off Hale Hill Road. Five parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius (Figure 1).

H2H developed a Scope of Work (SOW) approved by the APA specifying the locations sound level monitoring was conducted. The SOW incorporating the APA's November 28, 2022 comments on the location of Monitoring location M-3 and M-4 is attached as Appendix E.

3.0 SOUND LEVEL MONITORING

Sound level monitoring was conducted by H2H on December 20, 2022, and December 21, 2022. Monitoring was conducted at the five locations identified in the SOW (Figure 1).

3.1 ENVIRONMENTAL CONDITIONS

Weather data was collected from a weather station located at The Silo (Figure 1).

3.1.1 December 20, 2022

During the study period, the weather conditions included temperatures between 27 °F and 31 °F, winds out of the south between zero and six miles per hour, 70% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.1.2 December 21, 2022

During the study period, the weather conditions included temperatures between 23 °F and 32 °F, winds out of the southwest between zero and four miles per hour, 75% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.2 MONITORING EQUIPMENT

Sound level measurements were recorded using calibrated Casella CEL-633 ANSI or Quest SoundPro DL-2-1/3 sound level meters. Each monitor was set to log A-weighted, fast response, at one-second intervals. Each Casella monitor was programed to record audio to aid in identifying sound sources. Each unit was field calibrated before each monitoring event; each unit was also laboratory-qualified, technician calibrated (Appendix B). Each meter was tripod mounted at an approximate height of 5 feet, microphones were covered with windscreens. Monitors were outfitted with external batteries.

3.3 MONITORING LOCATION SOUND LEVELS

Sound levels were collected as discussed in Section 3.2 at each monitoring location between 10:00 a.m. – 4:00 p.m. (proposed testing hours). Sound level data was cleaned to remove anomalous sound sources, and data outside monitoring periods. Staffed sound level monitoring was conducted at each monitoring location to log the relative loudness, and the types of sounds that could be heard at each monitoring location. Photos of each monitoring location are provided in appendix B.

3.3.1 Monitoring Location M-1 –

Monitoring location M-1 is adjacent to Residential Receptor R-1 on Hale Hill Road at elevation 705 ft. amsl. 5,800 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-1 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-1 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic on Hale Hill Rd. to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 81.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 56.7 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 27.5 to 83.0 dBA.
- The average equivalent continuous sound level (L_{eq}) was 57.2 dBA

3.3.2 Monitoring Location M-2 -

Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surrounding Pulsifer Rd.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9 and Pulsifer Road,

- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 24.8 to 70.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 42.5 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 25.0 to 70.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.8 dBA

3.3.3 Monitoring Location M-3

Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9,

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.2 to 82.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 59.6 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9,

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 86.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 61.2 dBA

3.3.4 Monitoring Location M-4

Monitoring Location M-4 is southwest of the Firing Pad next to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Occasional birds,
- Recreational use (snowmobiles),

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 18.1 to 70.7 dBA.
- The average equivalent continuous sound level (L_{eq}) was 39.1 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Occasional birds,
- Recreational use (snowmobiles),

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.5 to 71.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.9 dBA.

3.3.5 Monitoring Location M-5

Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 19.6 to 65.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 37.2 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 19.8 to 58.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 34.7 dBA.

4.0 SOUND PROROGATION MODEL

4.1.1 Sound Source (M109A3GN 155mm Field Howitzer)

A sound propagation model was developed for the area within a two-mile radius of the Firing Pad using the International Standards Organization ISO 9613 -1,2,3 standards applied in the dBmap.net noise mapping tool. The model accounts for surface reflection and absorption, atmospheric absorption, geometric divergence, weather conditions, topography, and source sound power level.

The sound power level of the Source was calculated based on the sound pressure levels shown in Table E.2 of Appendix E (Noise Emission Data for M109, 155mm Field Howitzer). The goal of the analyses was to develop data that could be used to model the attenuation of sound produced by a howitzer due to the previous lack of available information. The results of the Norwegian Defense Research Establishments (FFI) study demonstrated correlation with their recorded sound levels from the field (data used in H2H's analyses) and proved to be suitable for use in the FFI database.

The sound pressure levels shown in Table E.2 were measured at 803 ft. (245 meters) from the sound source by seven sensors positions at increasing angles from the direction of fire. Sensor 1 is positioned 32 degrees from the direction of fire and recorded a sound pressure level of 130.5 dB (loudest recorded sound level across the seven sensors) at 803 ft. (245 meters). The data shown in table E.2 was produced taking the energy mean of 15 shots. Using industry standard calculations, the sound power level at the Sound Source (barrel of the M109, 155mm howitzer) was calculated to be 180.8 dB (163.2 dB(A)). The Sound Source sound level is without ground corrections. Uncorrected data has a higher sound presser level than corrected

data providing a conservative sound level model (see Appendix E, Table E.1, free field, compared to Table E.2, without ground correction).

Table 3 Shows the recorded sound pressure level from Table E.2 for each frequency indicated. The sound power level was calculated using the following formula.

$$L_W = L_p + \left|10 \cdot \log\left(\frac{Q}{4\pi \cdot r^2}\right)\right|$$

Lp= Sound Pressure Level = recorded sound pressure level from Table E.2
Lw= Sound Power level
Q= Directivity factor = 1 (Spherical Sound Propagation)
r= distance to source = 245 meters

The calculated A-weighted sound power level was calculated by adding/subtracting the dB(A) Filter to the calculated sound pressure level.

The resulting total sound level 180.8 dB / 163.2 dB(A) is calculated using the formula below and the calculated sound power levels show in table 1.

$$L_\Sigma = 10 \cdot \log_{10}\left(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}} + \cdots + 10^{\frac{L_n}{10}}\right) \text{ dB}$$

Lε = Sum level of sound 180.8 dB(A) / 163.2 dB(A)
L_n = Sound pressure from sperate sources

Table 1: Recorded Sound Pressure level / Calculated Sound Source Power level

Frequency (Hz)	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**
Recorded M109 Sound Pressure Level (dB) 245 m	120.4	116.5	105.7	90.3	101.2	99.9	96.4	93.1	88.8	86.1
Calculated Sound Power Level (dB)	179.1	175.3	164.5	149.1	160.0	158.7	155.2	151.9	147.6	144.9
Calculated Sound Power Level (dB(A))	139.6	149.1	148.4	140.5	156.8	158.7	156.4	152.9	146.5	138.3
dB(A) Filter	-39.5	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	-6.6

All input and results of the sound propagation model are attached as Appendix F.

The Image below (Image 1) demonstrates the accuracy of the sound propagation model. Image 1 shows the modeled sound pressure level (not A-weighted) at M-5 (same location as shown on Figure 3) and a receiver located 803 ft. (245 meters) west of the source labeled “Test Point.” The sound source (barrel of the M109, 155mm howitzer (180.8 dB), and all model parameters are unchanged. The Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB showing correlation within ISO standards.

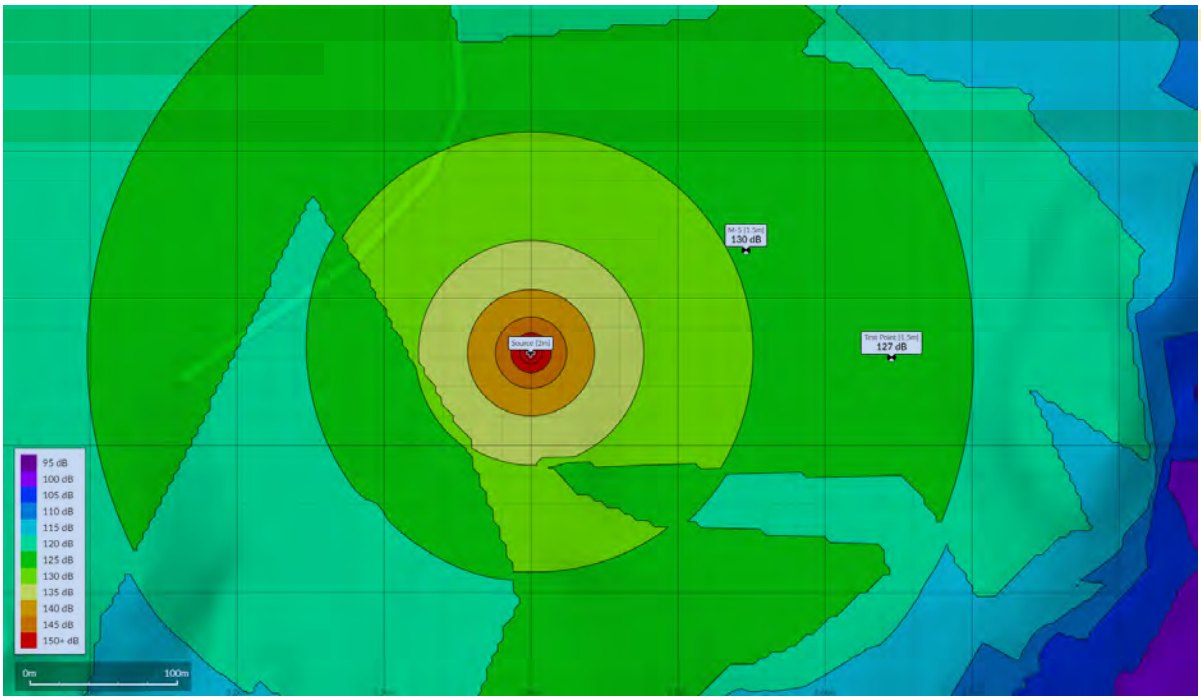

Image 1 – Modeled sound pressure level (not A- weighted) with Test Point

The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and Sound Source height of 6.5 feet is used. This field howitzer model is typical for its type and would represent the noisiest field howitzer tested on Site. The modeled scenario shows the M109A3GN firing from the Firing Pad (only location Sound Source will be operated) as shown on Figure 2. Appendix D summaries model input data.

The sound propagation models show the modeled impulse sound level produced by the Sound Source; the duration of the impulse sound level is approximately 4 milliseconds. Model results are shown without a 13-foot berm (Sound Mitigation Berm) north of the firing pad (Figure 3) and with the Sound Mitigation Berm north of the firing pad (Figure 4). The location of the Sound Mitigation Berm is shown on Figure 2. Sound pressure levels are A-weighted and shown in the form of isolines in 5 dB intervals from 45 dB(A) to 130 dB(A). Modeled sound levels at each monitoring location are labeled.

4.1.2 40-ton Haul Truck

A sound propagation model was developed for the same two-mile radius of the Firing Pad following the same standards. The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and sound source height of 6.5 feet is used. The sound power level used for the 40-ton Haul Truck (117.6 dB / 115.7 dB(A) is provided in the dBmap database. The Sound Mitigation Berm was not used for the 40-ton haul truck sound propagation model. Appendix D summaries model input data.

The 40-ton Haul Truck being modeled is similar to or louder than the haul truck that will be used to transport the barrel assembly and measurement equipment to the Firing Pad. Figure 5 shows the access road the Haul Truck will be operating on to access the Firing Pad. The Haul Truck was modeled operating at three

locations on the access road that would have the highest modeled sound level at identified receptors due to proximity and topography.

The sound propagation model shows the modeled sound level produced by the 40-ton Haul Truck (Figure 5). Sound levels are A-weighted and shown in the form of isolines in 5 dB intervals from 20 dB(A) to 85 dB(A). Modeled sound levels at each monitoring location are labeled.

4.2 EFFECT ON AMBIENT SOUND LEVELS

4.2.1 Sound Source (M109A3GN 155mm Field Howitzer)

To measure the effect the modeled impulse sound (shot fired from the howitzer) would have on ambient sound levels within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. The $L_{eq, 1\text{-}sec}$ recorded sound levels were exported to allow each $L_{eq, 1\text{-}sec}$ sound level over the monitoring period (10:00 a.m. to 4:00 p.m.) to be viewed individually. To measure how impulse sound levels would affect the ambient sound level at each monitoring location the modeled impulse sound level without the Sound Mitigation Berm (Figure 3) and with the Sound Mitigation Berm (figure 4) at each monitoring location is input into the ambient data for that monitoring location. This was done twice to model the effect of two impulse sound levels (two shots per day). The results of each modeled scenario are compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

Table 2a: Tuesday, December 20, 2022, Howitzer Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer (Sound Source)			155 mm Howitzer (Sound Source) With Sound Mitigation Berm		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	57.2	75	57.2	0	67	57.2	0
M-2	42.5	71	42.8	0.3	71	42.8	0.3
M-3	59.6	73	59.6	0	73	59.6	0
M-4	39.1	79	41.9	2.8	79	41.9	2.8
M-5	37.2	107	66.7	29.5	100	59.7	22.5

Table 2b: Wednesday, December 21, 2022, Howitzer Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer			155 mm Howitzer (Sound Source) With Sound Mitigation Berm		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	56.7	75	56.8	0.1	67	56.7	0
M-2	40.8	71	41.2	0.4	71	41.2	0.4
M-3	61.2	73	61.2	0	73	61.2	0
M-4	40.9	79	42.9	2	79	42.9	2
M-5	34.7	107	66.7	32	100	59.7	25

4.2.2 40-ton Haul Truck

To measure the effect the modeled sound (Haul Truck operating on site access road) would have on ambient sound level within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. Figure 5 and Table 3a / Table 3b show the modeled sound level at each monitoring location. The modeled sound level is well below the recorded ambient sound level at monitoring location M-1, M-2, M-3, and M-4 showing no potential impact. The modeled sound level at M-5 (66.7 dB(A)) is above the recorded ambient sound level of 34.7 dB(A). To measure how sound levels would affect the ambient sound level at M-5 the modeled sound level (Figure 4) at M-5 is input into the ambient data for that monitoring location. This was done ten times to model the effect of ten haul truck passes. No more than ten haul truck passes are anticipated per day. The modeled scenario at M-5 is compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

Table 3a: Tuesday, December 20, 2022, 40-ton Haul Truck Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	40-ton Haul Truck		
		Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	57.2	44	-	-
M-2	42.5	20	-	-
M-3	59.6	33	-	-
M-4	39.1	33	-	-
M-5	37.2	60	37.9	0.7

Table 3b: Wednesday, December 21, 2022, 40-ton Haul Truck Modeled Sound Level Summary Table

Monitoring Location	Recorded Ambient dB(A) Leq	40-ton Haul Truck		
		Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	56.7	44	-	-
M-2	40.8	20	-	-
M-3	61.2	33	-	-
M-4	40.9	33	-	-
M-5	34.7	60	37.9	3.2

5.0 SUMMARY & CONCLUSIONS

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. Testing will only occur on weekdays, between the hours of 10:00 a.m. and 4:00 p.m. No more than two shots will be fired in one day. Forty-four residential receptors, and five parcels of NYS Land identified as Wild Forest fall within the Project Area (Figure 1). Sound level monitoring was conducted at five monitoring locations on December 20, 2022, and December 21, 2022, to determine ambient sound levels within the Project Area. Potential significant sources of sound associated with the project are the testing of the 155 mm howitzer and operation of 40-ton haul truck along the site access road to transport the 155 mm howitzer and monitoring equipment to the firing pad.

Two sound propagation models, with and without the Sound Mitigation Berm, were developed to evaluate the impulse sound level produced by the Sound Source (barrel of the M109, 155mm howitzer) within the Project Area (Figure 3 & 4). The effect of the modeled impulse sound level on ambient sound levels from each monitoring location is discussed in Section 4.2.1 and summarized in Table 2. An additional sound propagation model was developed to evaluate the sound levels produced by a 40-ton Haul Truck operating along the access road to the site. The effect of the modeled sound level on ambient sound levels from each monitoring location is discussed in Section 4.2.2 and summarized in Table 3.

The modeled sound level for the 40-ton Haul Truck operating along the access road to the site is well below the record ambient sound levels at M-1, M2, M3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 3). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 5) shows a modeled sound level of 60 dB(A), and a modeled ambient sound level of 37.9 dB(A) a 3.2 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

The modeled change in ambient sound level from two shots of the Sound Source (barrel of the M109, 155 howitzer) without the Sound Mitigation Berm is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 2). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 3) shows a modeled impulse sound

level of 107 dB(A) at M-5, and a modeled ambient sound level of 66.7 dB(A) a 32.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

In addition to the mitigative measures currently proposed (remote location of Site / natural topographic rise between Sound Source and Residential Receptors) UCI is proposing to construct a Sound Mitigation Berm. The modeled change in ambient sound level from two shots of the Sound Source (barrel of the M109, 155 howitzer) with the Sound Mitigation Berm is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identified residential receptors (Table 2). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 4) shows a modeled impulse sound level of 100 dB(A) at M-5, and a modeled ambient sound level of 59.7 dB(A) a 25.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022. The modeled impulse sound level at the property corner of the Wild Forest (R-45) parcel is 102 dB(A), and a modeled ambient sound level of 61.7 dB(A).

There are no structures identified, public trails on or means of public access to R-45. In reviewing surrounding land uses three currently permitted hard rock mining operations exist within a 2.1-mile radius of the Site. In addition, one of the currently permitted mining operations is adjacent to lands classified as Wilderness. Lands classified as Wilderness are less impacted by human use than lands classified as State Forest. Hard rock mining operations require regular blasting as part of their weekly operations, under the mines NYSDEC Mine Land Reclamation Permit an air blast limit of 133 dB measured to the closest structure outside the permit area is permitted. The closest Structure to the Firing pad is the Pulsifer residents (R-1) 5,200 ft. with a modeled impulse sound level implementing the Sound Mitigation Berm of 101 dB / 69 dB(A).

Based on the information presented in this report the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area.

FIGURES

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FIGURE 1 –SITE OVERVIEW MAP

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FIGURE 1- SITE OVERVIEW MAP

615000 m

225000 m

615000 m

N

2 miles

R-17 Gibson
R-18 Drummond
R-16 Williams
R-15 Ero
R-14 Bigelow
R-13 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-8 Marty
Hooper
R-1 Pulsifer
M-1
R-2 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-46 Wild Forest
R-45 Wild Forest
R-19 Bigelow
M-5
R-20 Colegrove
M-3
M-4
R-22 Mitchell
R-21 Laughin
R-47 Wild Forest
R-23 Mitchell
R-25 Ingram
R-24 Mitchell
610000 m
R-26 Salva
R-28
R-27 Smith
R-30 Ryan
R-48 Wild Forest
R-49 Wild Forest
R-31 Cassavaugh
R-33 OKusky
R-32 Ashline
R-34 Anderson
R-36 Huckins
R-38 Moore
R-37
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-44 Pulsifer
R-42 Pulsifer
M-2
R-43 Stevens

610000 m

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- Receptor - Wild Forest
- Residential Receptor
- Sound Level Monitoring Locations

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

225000 m

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596

FIGURE 2 – SITE MAP

597

FIGURE - 2 SITE MAP



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FIGURE 3 – SOUND PROPAGATION MAP
NO SOUND MITIGATION BERM

599

FIGURE 3 - SOUND PROPOGATION MAP
NO SOUND MITIGATION BERM

615000 m
225000 m
610000 m
600

N

2 miles

Sound Source
M-1 75 dB(A)
M-2 71 dB(A)
M-3 73 dB(A)
M-4 79 dB(A)
M-5 107dB(A)

R-1 Pulsifer
R-2 Benway
R-3 Benway
R-4 Rock
R-5 Wimett
R-6 Cross
R-8 Marty
R-9 Connor
R-10 Siegel
R-11 Canavan
R-13 Stone
R-14 Bigelow
R-15 Ero
R-16 Williams
R-17 Gibson
R-18 Drummond
R-19 Bigelow
R-20 Colegrove
R-21 Laughin
R-22 Mitchell
R-23 Mitchell
R-24 Mitchell
R-25 Ingram
R-26 Salva
R-27 Smith
R-28
R-30 Ryan
R-31 Cassavaugh
R-32 Ashline
R-33 OKusky
R-34 Anderson
R-36 Huckins
R-37
R-38 Moore
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-42 Pulsifer
R-43 Stevens
R-44 Pulsifer
R-45 Wild Forest
R-46 Wild Forest
R-47 Wild Forest
R-48 Wild Forest
R-49 Wild Forest
Canavan
Hooper

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

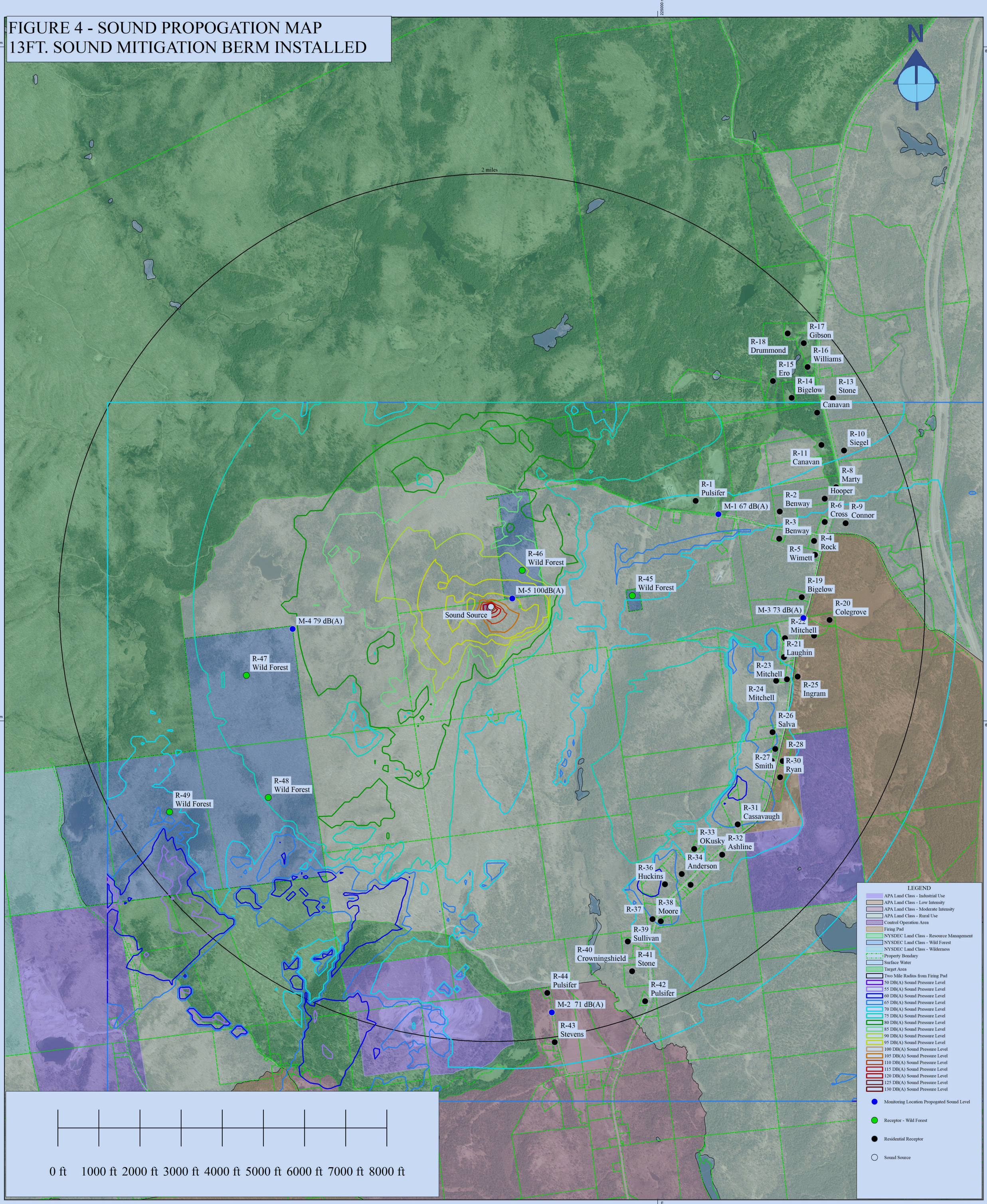
LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 45 DB(A) Sound Pressure Level
- 50 DB(A) Sound Pressure Level
- 55 DB(A) Sound Pressure Level
- 60 DB(A) Sound Pressure Level
- 65 DB(A) Sound Pressure Level
- 70 DB(A) Sound Pressure Level
- 75 DB(A) Sound Pressure Level
- 80 DB(A) Sound Pressure Level
- 85 DB(A) Sound Pressure Level
- 90 DB(A) Sound Pressure Level
- 95 DB(A) Sound Pressure Level
- 100 DB(A) Sound Pressure Level
- 105 DB(A) Sound Pressure Level
- 110 DB(A) Sound Pressure Level
- 115 DB(A) Sound Pressure Level
- 120 DB(A) Sound Pressure Level
- 125 DB(A) Sound Pressure Level
- 130 DB(A) Sound Pressure Level
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

FIGURE 4 – SOUND PROPAGATION MAP
13FT. SOUND MITIGATION BERM INSTALLED

601

FIGURE 4 - SOUND PROPOGATION MAP
13FT. SOUND MITIGATION BERM INSTALLED



602

FIGURE 5 – SOUND PROPAGATION MAP
HAUL TRUCK

603

FIGURE 5 - SOUND PROPOGATION MAP
HAUL TRUCK

615000 m
225000 m
610000 m

N

2 miles

Sound Source
Sound Source
Sound Source
Access Road To Site

M-1 44 dB(A)
M-2 20 dB(A)
M-3 33 dB(A)
M-4 33 dB(A)
M-5 60 dB(A)

R-1 Pulsifer
R-2 Benway
R-3 Benway
R-4 Rock
R-5 Wimett
R-6 Cross
R-8 Marty
R-9 Connor
R-10 Siegel
R-11 Canavan
R-13 Stone
R-14 Bigelow
R-15 Ero
R-16 Williams
R-17 Gibson
R-18 Drummond
R-19 Bigelow
R-20 Colegrove
R-21 Laughin
R-22 Mitchell
R-23 Mitchell
R-24 Mitchell
R-25 Ingram
R-26 Salva
R-27 Smith
R-28
R-30 Ryan
R-31 Cassavaugh
R-32 Ashline
R-33 OKusky
R-34 Anderson
R-36 Huckins
R-37
R-38 Moore
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-42 Pulsifer
R-43 Stevens
R-44 Pulsifer
R-45 Wild Forest
R-46 Wild Forest
R-47 Wild Forest
R-48 Wild Forest
R-49 Wild Forest
Canavan
Hooper

LEGEND
- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 20 dB(A) Sound Pressure Level
- 25 dB(A) Sound Pressure Level
- 30 dB(A) Sound Pressure Level
- 35 dB(A) Sound Pressure Level
- 40 dB(A) Sound Pressure Level
- 45 dB(A) Sound Pressure Level
- 50 dB(A) Sound Pressure Level
- 55 dB(A) Sound Pressure Level
- 60 dB(A) Sound Pressure Level
- 65 dB(A) Sound Pressure Level
- 70 dB(A) Sound Pressure Level
- 75 dB(A) Sound Pressure Level
- 80 dB(A) Sound Pressure Level
- 85 dB(A) Sound Pressure Level
- acess road to site
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

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APPENDICES

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APPENDIX A –
NYSDEC – ASSESSING AND MITIGATING NOISE IMPACTS

606

Assessing and Mitigating Noise Impacts

New York State
Department of Environmental Conservation

PROGRAM POLICY	**Department ID: DEP-00-1**	**Program ID: n/a**
Issuing Authority: Environmental Conservation Law Articles 3, 8, 23, 27 Name: Jeffrey Sama Title: Director Signature: /S/ Date: 10/6/00 Issuance Date: October 6, 2000 Revised: February 2, 2001	**Originating Unit: Division of Environmental Permits** Office/Division: Environmental Permits Unit: Phone: (518) 402-9167 Latest Review Date (Office Use):	

Abstract: Facility operations regulated by the Department of Environmental Conservation located in close proximity to other land uses can produce sound that creates significant noise impacts for proximal sound receptors. This policy and guidance presents noise impact assessment methods, examines the circumstances under which sound creates significant noise impacts, and identifies avoidance and mitigative measures to reduce or eliminate noise impacts.

Related References: See references pages 27 and 28.

I. PURPOSE[1]

This policy is intended to provide direction to the staff of the Department of Environmental Conservation for the evaluation of sound levels and characteristics (such as pitch and duration) generated from proposed or existing facilities. This guidance also serves to identify when noise levels may cause a significant environmental impact and gives methods for noise impact assessment, avoidance, and reduction measures. These methods can serve as a reference to applicants preparing environmental assessments in support of an application for a permit. Additionally, this guidance explains the Department's regulatory authority for undertaking noise evaluations and for imposing conditions for noise mitigation measures in the agency's approval

[1] A Program Policy Memorandum is designed to provide guidance and clarify program issues for Division staff to ensure compliance with statutory and regulatory requirements. It provides assistance to New York State Department of Environmental Conservation (DEC) staff and the regulated community in interpreting and applying regulations and statutes to assure that program uniformity is attained throughout the State. Nothing set forth in a Program Policy Memorandum prevents DEC staff from varying from that guidance as specific circumstances may dictate, provided the staff's actions comply with applicable statutory and regulatory requirements. As this guidance document is not a fixed rule, it does not create any enforceable right by any party using the Program Policy Memorandum.

of permits for various types of facilities pursuant to regulatory program regulations and the State Environmental Quality Review Act (SEQR).

II. BACKGROUND

Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by proposed or existing facilities may become noise due to land use surrounding the facility. When lands adjoining an existing or proposed facility contain residential, commercial, institutional or recreational uses that are proximal to the facility, noise is likely to be a matter of concern to residents or users of adjacent lands.

A. Sources of Noise Generation

The three major categories of noise sources associated with facilities are (1) fixed equipment or process operations; (2) mobile equipment or process operations; and (3) transport movements of products, raw material or waste. The fixed plant may include a very wide range of equipment including: generators; pumps; compressors; crushers of plastics, stone or metal; grinders; screens; conveyers; storage bins; or electrical equipment. Mobile operations may include: drilling; haulage; pug mills; mobile treatment units; and service operations. Transport movements may include truck traffic within the operation, loading and unloading trucks and movement in and out of the facility. Any or all of these activities may be in operation at any one time. Singular or multiple effects of sound generation from these operations may constitute a potential source of noise.

B. Potential for Adverse Impacts

Numerous environmental factors determine the level or perceptibility of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; time of day; wind direction; temperature gradient; and relative humidity. The characteristics of a sound are also

important determining factors for considering it as noise. The amplitude (loudness), frequency (pitch), impulse patterns and duration of sound all affect the potential for a sound to be a noise. The combination of sound characteristics, environmental factors and the physical and mental sensitivity of a receptor to a sound determine whether or not a sound will be perceived as a noise. This guidance uses these factors in assessing the presence of noise and the significance of its impacts. It relies upon qualitative and quantitative sound evaluation techniques and sound pressure level impact modeling presented in accepted references on the subject.

C. Mitigation

Mitigation refers to actions that will be taken to reduce the effects of noise or the noise levels on a receptor. Adverse noise effects generated by a facility can be avoided or reduced at the point of generation thereby diminishing the effects of the noise at the point of reception. This guidance identifies various mitigation techniques and their proper application either at the source of noise generation or on a facility's property. Alternative construction or operational methods, equipment maintenance, selection of alternative equipment, physical barriers, siting of activities, set backs, and established hours of construction or operation, are among the techniques that can successfully avoid or reduce adverse noise effects.

D. Decision Making

When an assessment of the potential for adverse noise impacts indicates the need for noise mitigation, it is preferred that specifications for such measures be incorporated in a noise analysis and in the applicant's work or operational plan necessary for a complete application. Presenting a plan that incorporates effective noise mitigation provisions facilitates the Department's technical and environmental review and minimizes or negates the imposition of permit conditions by the Department. Adherence to these plans becomes a condition of a permit.

Noise avoidance and mitigation measures may also be imposed directly as conditions of permit issuance. This guidance will review the statutory authority under which the Department can require the mitigation of noise effects.

III. POLICY

In the review of an application for a permit, the Department of Environmental Conservation is to evaluate the potential for adverse impacts of sound generated and emanating to receptors outside of the facility or property. When a sound level evaluation indicates that receptors may experience sound levels or characteristics that produce significant noise impacts or impairment of property use, the Department is to require the permittee or applicant to employ reasonable and necessary measures to either eliminate or mitigate adverse noise effects. Options to be used to fulfill this guidance should be implemented within the existing regulatory and environmental review framework of the agency.

Regulatory authority for assessing and controlling noise effects are contained in both SEQR and specific Department program regulations. Specific regulatory references are as follows:

Section 3-0301(1)(i) of the Environmental Conservation Law (ECL) states that the commissioner shall have the power to: "i. Provide for prevention and abatement of all water, land and air pollution including but not limited to that related to particulates, gases, dust, vapors, noise, radiation, odor, nutrients and heated liquids."

To comply with Article 8 of the ECL and 6 NYCRR Part 617, State Environmental Quality Review Act, consideration of all relevant environmental issues must be undertaken in making a determination of environmental significance. Noise impact potential is one of many potential issues for consideration in a SEQR review.

Environmental Conservation Law (ECL) Article 23, Title 27, Mined Land Reclamation Law (MLRL), requires applicants for permits to prepare and submit a mined land use plan to the Department for approval. The plan must describe, "the applicant's mining method and measures

to be taken to minimize adverse environmental impacts resulting from the mining operation." The provisions to be incorporated in a Mined Land Use Plan, as specified in 6 NYCRR Section 422.2, include the control of noise as a component of the plan.

The solid waste regulations at 6 NYCRR Subdivision 360-1.14(p), establish A-weighted decibel levels that are not to be exceeded at the property line of a facility.

The Division of Air Resources has regulations in 6 NYCRR Parts 450 through 454 that regulate the allowable sound level limits on certain motor vehicles. The statutory authority for these regulations is found in the New York State Vehicle and Traffic Law, Article 10, Section 386.

This guidance does not supercede any local noise ordinances or regulations.

IV. RESPONSIBILITY

The environmental analyst, acting as project manager for the review of applications for permits or permit modifications and working in concert with the program specialist, is responsible for ensuring that sound generation and noise emanating from proposed or existing facilities are properly evaluated. For new permits or significantly modified permits, there should be a determination as to the potential for noise impacts, and establishment of the requirements for noise impact assessment to be included in the application for permit. Where the Department is lead agency, the analyst is responsible for making a determination of significance pursuant to SEQR with respect to potential noise impacts and include documentation for such determination.

Where impacts are to be avoided or reduced through mitigation measures, the analyst, or where there are program requirements to address noise, the program specialist, should determine the effectiveness and feasibility of those measures and ensure that the permit conditions contain specific details for such measures. It should also be determined if additional measures to control noise are to be imposed as a condition of permitting. Appropriate permit language for the permit conditions should be developed by the program specialist and the analyst. The results of noise impact evaluations and the effectiveness of mitigation measures

shall be incorporated into SEQR documents and, where necessary, permit conditions shall be placed in final permits to ensure effective noise control.

When it is determined that potential noise effects, as well as other issues, warrant evaluation of impacts and mitigation measures in a Draft Environmental Impact Statement (EIS) prepared pursuant to SEQR, the environmental analyst with the Division of Environmental Permits assumes responsibility for determining the level of evaluation needed to assess sound level generation, noise effects, and mitigation needs and feasibility.

For existing facilities, the program specialist will determine the need for additional mitigation measures to control noise effects either in response to complaints or other changes in circumstances such as new noise from existing facilities or a change in land-use proximal to the facility.

The applicant or their agent, in preparing an application for a permit and supporting documentation, is responsible for assessing the potential noise impacts on area receptors. When potential adverse noise impacts are identified, the applicant should incorporate noise avoidance and reduction measures in the construction or operating plans. The applicant's submittal should also assess the effectiveness of proposed mitigation measures in eliminating adverse noise reception. Where noise effects are determined to be a reason in support of a SEQR positive declaration, the applicant shall assess noise impacts, avoidance, and mitigation measures in a Draft EIS using methodologies acceptable to this Department.

V. PROCEDURE

The intent of this section is to: introduce terms related to noise analyses; describe some of the various methods used to determine the impacts of sound pressure levels on receptors; identify some of the various attenuators of noise; and list some of the mitigative techniques that can be used to reduce the effects of noise on a receptor. At the end of the section three levels of analysis are described. The first level determines the potential for adverse noise impacts based on noise characteristics and sound pressure increases solely on noise attenuation over distance between the source and receptor of the noise. The second level factors other considerations such as topography and noise abatement measures in determining if adverse

noise impacts will occur. The third level evaluates noise abatement alternatives and their effectiveness in avoiding or reducing noise impacts.

The environmental effects of sound and human perceptions of sound can be described in terms of four characteristics:

1. Sound Pressure Level (SPL may also be designated by the symbol L_p) or perceived loudness is expressed in decibels (dB) or A-weighted decibel scale dB(A) which is weighted towards those portions of the frequency spectrum, between 20 and 20,000 Hertz, to which the human ear is most sensitive. Both measure sound pressure in the atmosphere.

2. Frequency (perceived as pitch), the rate at which a sound source vibrates or makes the air vibrate.

3. Duration i.e., recurring fluctuation in sound pressure or tone at an interval; sharp or startling noise at recurring interval; the temporal nature (continuous vs. intermittent) of sound.

4. Pure tone which is comprised of a single frequency. Pure tones are relatively rare in nature but, if they do occur, they can be extremely annoying.

Another term, related to the average of the sound energy over time, is the Equivalent Sound Level or $L_{eq.}$ The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent Sound Level is considered to be directly related to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time. By its derivation L_{eq} does not express the maximum nor minimum SPLs that may occur in a given time period. These maximum and minimum SPLs should be given in the noise analysis. The time interval over which the L_{eq} is measured should always be given. It is generally shown as a parenthetic; $L_{eq\,(8)}$ would indicate that the sound had been measured for a period of eight hours.

Equivalent Sound Level (L_{eq}) correlates well and can be combined with other types of noise analyses such as Composite Noise Rating, Community Noise Equivalent Level and day-night noise levels characterized by L_{dn} where an $L_{eq(24)}$ is measured and 10 dBA is added to all noise levels measured between 10 pm and 7 am. These different types of noise analyses

basically combine noise measurements into measures of cumulative noise exposure and may weight noise occurring at different times by adding decibels to the actual decibel level. Some of these analyses require more complex noise analysis than is mentioned in this guidance. They may be used in a noise analyses prepared for projects.

Designations for sound levels may also be shown as $L_{(10)}$ or $L_{(90)}$ in a noise analysis. These designations refer to the sound pressure level (SPL) that is exceeded for 10% of the time over which the sound is measured, in the case of $L_{(10)}$, and 90% of the time, in the case of $L_{(90)}$. For example, an $L_{(90)}$ of 70 dB(A) means that 70 dB(A) is exceeded for 90% the time for which the measurement was taken.

A. Environmental Setting and Effects on Noise Levels

1. Sound Level Reduction Over Distance - It is important to have an understanding of the way noise decreases with distance. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, SPL changes in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dB reduction in the sound. Therefore, a sound level of 70 dB at 50 feet would have a sound level of approximately 64 dB at 100 feet. At 200 feet sound from the same source would be perceived at a level of approximately 58 dB.

2. Additive Effects of Multiple Sound Sources - The total sound pressure created by multiple sound sources does not create a mathematical additive effect. Below Table A is given to assist you in calculating combined noise sources. For instance, two proximal noise sources that are 70 dBA each do not have a combined noise level of 140 dBA. In this case the combined noise level is 73 dBA. Since the difference between the two sound levels is 0 dB, Table A tells us to add 3 dB to the sound level to compensate for the additive effects of the sound. To find the cumulative SPL assess the SPLs starting with the two lowest readings and work up to the difference between the two highest readings. For several pieces of equipment, operating at one

time, calculate the difference first between the two lowest SPLs, check Table A and add the appropriate number of decibels to the higher of the two sound levels. Next, take the sound level that was calculated using Table A and subtract the next lowest sound level to be considered for the operation. Consult Table A again for the additive effect and add this to the higher of the two sound levels. Follow this process until all the sound levels are accounted for. As an example, let us say that an area for a new facility is being cleared. The equipment to be used is: two chainsaws, one operating at 57 dBA and one at 60 dBA; a front end loader at 80 dBA; and a truck at 78 dBA. Start with the two lowest sound levels: 60 dBA - 57 dBA = 3 dBA difference. Consulting the chart add 2 dBA to the higher sound level. The cumulative SPL of the two chainsaws is 62 dBA. Next, subtract 62 dBA from 78 dBA. 78 dBA - 62 dBA = 16 dBA. In this case, 0 dBA is added to the higher level so we end up with 78 dBA. Lastly, subtract 78 dBA from the 80 dBA. 80 dBA - 78 dBA = 2 dBA a difference of 2 dBA adds 2 dBA to the higher SPL or 82 dBA. The SPL from these four pieces of equipment operating simultaneously is 82 dBA.

Table A

Approximate Addition of Sound Levels

Difference Between Two Sound Levels	Add to the Higher of the Two Sound Levels
1 dB or less	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0 dB

(USEPA, Protective Noise Levels, 1978)

3. Temperature and Humidity - Sound energy is absorbed in the air as a function of temperature, humidity and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. Such attenuation is short term and, since it occurs over a great distance, should not be considered in calculations. Higher temperatures tend to increase sound velocity but does

not have an effect on the SPL. Sound waves bend towards cooler temperatures. Temperature inversions may cause temporary problems when cooler air is next to the earth allowing for more distant propagation of sound. Similarly, sound waves will bend towards water when it is cooler than the air and bounce along the highly reflective surface. Consequently large water bodies between the sound source and the receptor may affect noise attenuation over distance.

4. Time of Year - Summer time noises have the greatest potential for causing annoyance because of open windows, outside activities, etc. During the winter people tend to spend more time indoors and have the windows closed. In general, building walls and windows that are closed provide a 15 dB reduction in noise levels. Building walls with the windows open allow for only a 5 dB reduction in SPL.

5. Wind - Wind can further reduce the sound heard at a distance if the receptor is upwind of the sound. The action of the wind disperses the sound waves reducing the SPLs upwind. While it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experienced at the same distance without a wind. This dispels the common belief that sound levels are increased downwind due to wind carrying noise.

6. Land forms and structures - In certain circumstances, sound levels can be accentuated or focused by certain features to cause adverse noise impacts at specified locations. At a hard rock mine, curved quarry walls may have the potential to cause an amphitheater effect while straight cliffs and quarry walls may cause an echo. Buildings that line streets in cities can cause a canyon effect where sound can be reflected from the building surfaces similar to what might happen in a canyon. Consideration of noise impacts associated with these types of conditions may require specialized expertise to evaluate impact potential and to formulate suitable mitigation techniques.

Consideration of existing noise sources and sound receptors in proximity to a proposed activity can be important considerations even when the activity under review is not a noise source. Topography, vegetation, structures and the relative location of noise receptors and sources to these features are all aspects of the environmental setting that can influence noise impact potential. As such, land alteration may also indirectly create an adverse noise impact where natural land features or manmade features serve as a noise barrier or provide noise attenuation for existing sources of noise, i.e. highway, railroads, manufacturing activity. Removal of these features, i.e. hills, vegetation, large structures or walls, can expose receptors to increased sound pressure levels causing noise problems where none had previously existed.

B. Impact Assessment

1. Factors to Consider

Factors to consider in determining the impact of noise on humans, are as follows:

a. Evaluation of Sound Characteristics

(1) Ambient noise level - A noise can only intrude if it differs in character or SPL from the normal ambient sound. Most objective attempts to assess nuisance noise adopt the technique of comparing the noise with actual ambient sound levels or with some derived criterion.

(2) Future noise level - The ambient noise level plus the noise level from the new or proposed source.

(3) Increase In Sound Pressure Level - A significant factor in determining the annoyance of a noise is Sound Pressure Level (SPL). SPLs are measured in decibels.

(4) Sharp and Startling Noise - These high frequency and high intensity noises can be extremely annoying. When initially evaluating the effects

of noise from an operation, pay particular attention to noises that can be particularly annoying. One such noise is the back-up beepers required to be used on machinery. They definitely catch one's attention as they were meant to do. Continual beeping by machinery can be mitigated (see Section V.C. Mitigation - Best Management Practices). Another impulse noise source that can be very annoying is the exhaust from compressed air machinery. This exhaust is usually released in loud bursts. Compressed air exhaust can also be mitigated if it causes a noise problem by using readily available mufflers or specifically designed enclosures.

(5) Frequency and Tone - Frequency is the rate at which a sound source vibrates or makes the air vibrate. Frequency is measured in Hertz (Hz). Frequency can also be classified as high ("sharp"), low ("dull"), and moderate. Pure tones are rare in nature. Tonal sounds usually consist of pure tones at several frequencies. Pure tones and tonal sounds are discerned more readily by the human ear. Pure tones and tonal sounds are compensated for in sound studies by adding a calculated number of dB(A) to the measured sound pressure.

(6) Percentile of Sound Levels - Fluctuations of SPLs can be expressed as a percentile level designated as $L_{(n)}$ where a given decibel level is exceeded *n* % of the time. A designation of $L_{(10)}$ = 70 dBA means the measured SPLs exceeded 70 dBA 10% of the time. A designation of $L_{(90)}$ = 70 dBA means the measured SPLs were exceeded 90% of the time. $L_{(90)}$ is often used to designate the background noise level.

(7) Expression of Overall Sound - Part of the overall assessment of sound is the *Equivalent Sound Level* (L_{eq}) which assigns a single value of sound level for a period of time in which varying levels of sound are experienced over that time period. The L_{eq} value provides an indication of the effects of sound on people. It is also useful in establishing the ambient sound levels at a potential noise source.

In order to evaluate the above factors in the appropriate context, one must identify the following: 1) appropriate receptor locations for sound level calculation or measurement; 2) ambient sound levels and characteristics at these receptor locations; and 3) the sound pressure increase and characteristics of the sound that represents a significant noise effect at a receptor location.

b. Receptor Locations

Appropriate receptor locations may be either at the property line of the parcel on which the facility is located or at the location of use or inhabitance on adjacent property. The solid waste regulations require the measurements of sound levels be at the property line. The most conservative approach utilizes the property line. The property line should be the point of reference when adjacent land use is proximal to the property line. Reference points at other locations on adjacent properties can be chosen after determining that existing property usage between the property line and the reference point would not be impaired by noise, i.e., property uses are relatively remote from the property line. The location of the facility should be shown on a map in relation to each potential receptor. Any future expansion should be described in a narrative as well as depicted on a map. The map and narrative should also include the distance of the operation to each point of reception including the distance at the point in time when an expanding operation will be closest to the receptors.

c. Thresholds for Significant Sound Pressure Level (SPL) Increase

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on

existing SPLs and the character of surrounding land use and receptors. SPL increases approaching 10 dB result in a perceived doubling of SPL. The perceived doubling of the SPL results from the fact that SPLs are measured on a logarithmic scale. An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases. The above thresholds as indicators of impact potential should be viewed as guidelines subject to adjustment as appropriate for the specific circumstances one encounters.

Establishing a maximum SPL at the point of reception can be an appropriate approach to addressing potential adverse noise impacts. Noise thresholds are established for solid waste management facilities in the Department's Solid Waste regulations, 6 NYCRR Part 360. Most humans find a sound level of 60 - 70 dB(A) as beginning to create a condition of significant noise effect (EPA 550/9-79-100, November 1978). In general, the EPA's "Protective Noise Levels" guidance found that ambient noise levels # 55 dBA $L_{(dn)}$ was sufficient to protect public health and welfare and, in most cases, did not create an annoyance (EPA 550/9-79-100, November 1978). In non-industrial settings the SPL should probably not exceed ambient noise by more than 6 dB(A) at the receptor. An increase of 6 dB(A) may cause complaints. There may be occasions where an increase in SPLs of greater than 6 dB(A) might be acceptable. The addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dB(A). This would be considered the "upper end" limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet. Some outdoor activities can be conducted at a SPL of 65 dB(A). Still lower ambient noise levels may be necessary if there are sensitive receptors nearby. These goals can be attained by using the mitigative techniques outlined in this guidance.

Ambient noise SPLs in industrial or commercial areas may exceed 65 dB(A) with a high end of approximately 79 dB(A) (EPA 550/9-79-100, November 1979). In these instances mitigative measures utilizing best management practices should be used in an effort to ensure that a facility's generated sound levels are at a minimum. The goal in an industrial/commercial area, where ambient SPLs are already at a high level, should be not to exceed the ambient SPL. Remember, if a new source

operates at the same noise level as the ambient, then 3 dB(A) must be added to the existing ambient noise level to obtain the future noise level. If the goal is not to raise the future noise levels the new facility would have to operate at 10 dB(A) or more lower than the ambient.(see Table A)

Table B

HUMAN REACTION TO INCREASES IN SOUND PRESSURE LEVEL

Increase in Sound Pressure (dB)	Human Reaction
Under 5	Unnoticed to tolerable
5 - 10	Intrusive
10 - 15	Very noticeable
15 - 20	Objectionable
Over 20	Very objectionable to intolerable

(Down and Stocks - 1978)

Impact assessment will vary for specific project reviews, but must consist of certain basic components for all assessments. Additional examination of sound generation and noise reception are necessary, where circumstances warrant. Sound impact evaluation is an incremental process, with four potential outcomes:

- exemption criteria are met and no noise evaluation is required;
- noise impacts are determined to be non-significant (after first-level evaluation);
- noise impacts are identified as a potential issue but can be readily mitigated (after second level evaluation); or
- noise impacts are identified as a significant issue requiring analysis of alternatives as well as mitigation (third level evaluation).

All levels of evaluation may require preparation of a noise analysis. The required scope of noise impact analysis can be rudimentary to rather sophisticated, depending on circumstances and the results obtained from initial levels of evaluation. Recommendations for each level of evaluation are presented below.

2. Situations in Which No Noise Evaluation is Necessary

When certain criteria are satisfied, the need for undertaking a noise impact analysis at any level is eliminated. These criteria are as follows:

a. The site is contained within an area in which local zoning provides for the intended use as a "right of use". It does not apply to activities that are permissible only after an applicant is granted a special use permit by the local government; and

b. The applicant's operational plan incorporates appropriate best management practices (BMPs [see Section V.C. Mitigation - Best Management Practices]) for noise control for all facets of the operation.

Where activities may be undertaken as a "right of use", it is presumed that noise has been addressed in establishing the zoning. Any residual noise that is present following BMP implementation should be considered an inherent component of the activity that has been found acceptable in consideration of the zoning designation of the site.

3. First Level Noise Impact Evaluation

The initial evaluation for most facilities should determine the maximum amount of sound created at a single point in time by multiple activities for the proposed project. All facets of the construction and operation that produce noise should be included such as land clearing activities (chain saw and equipment operation), drilling, equipment operation for excavating, hauling or conveying materials, pile driving, steel work, material processing, product storage and removal. Land clearing and construction may be only temporary noise at the site whereas the ongoing operation of a facility would be considered permanent noise. An analysis may be required for

various phases of the construction and operation of the project to assure that adverse noise effects do not occur at any phase.

To calculate the sound generated by equipment operation, one can consult the manufacturers' specifications for sound generation, available for various types of equipment. Another option for calculating the sound to be generated by equipment is to make actual measurements of sound generated by existing similar equipment, elsewhere.

Tables C and D summarize noise measurements from some common equipment used in construction and mining. Table E summarizes the noise level, in decibels (dB[A]), from some common sources. This information can be used to assist Department staff in relating potential noise impacts to sound levels produced by commercial and industrial activities. Use of these tables in the first level of analysis will help determine whether or not noise will be an issue and whether actual measurements should be made to confirm noise levels.

Table C

PROJECTED NOISE LEVELS

Noise Source	Measurements	1,000 feet	2,000 feet	3,000 feet
Primary and secondary crusher	89 dB(A) at 100 ft	69.0 dB(A)	63.0 dB(A)	59.5 dB(A)
Hitachi 501 shovel loading	92 dB(A) at 50 ft	66.0 dB(A)	60.0 dB(A)	56.5 dB(A)
Euclid R-50 pit truck loaded	90 dB(A) at 50 ft	64.0 dB(A)	58.0 dB(A)	54.4 dB(A)
Caterpillar 988 loader	80 dB(A) at 300 ft	69.5 dB(A)	63.5 dB(A)	60.0 dB(A)

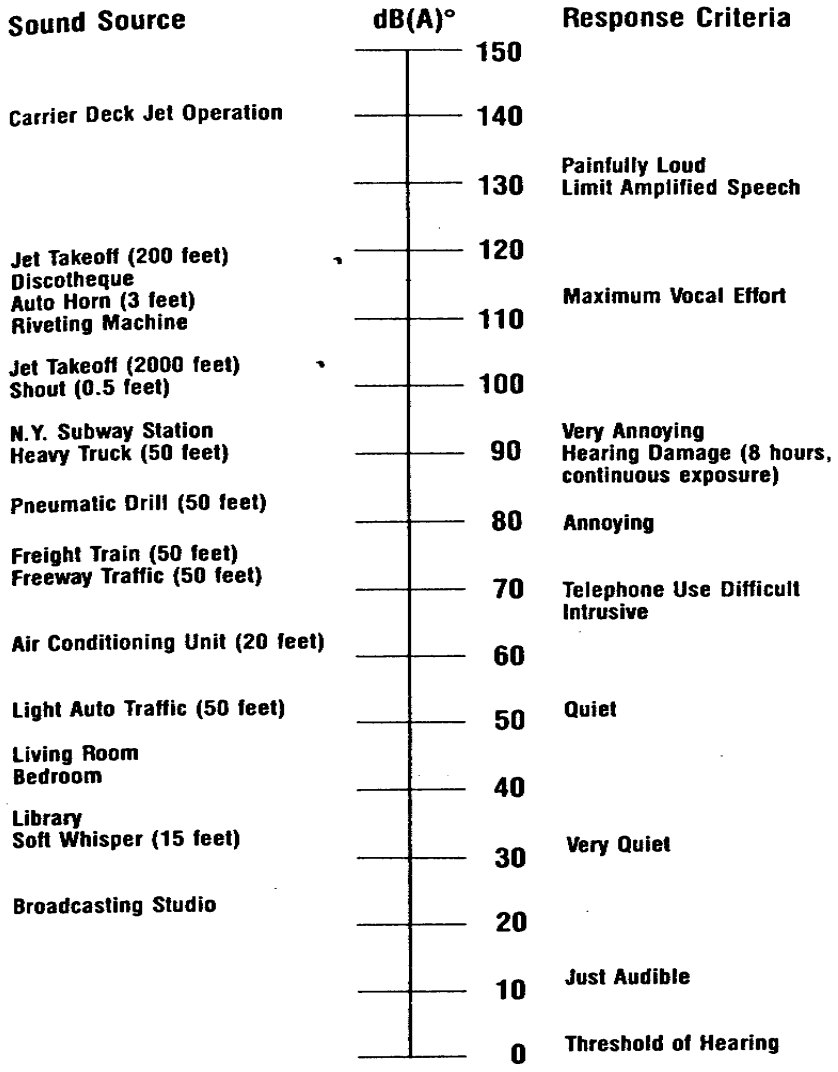
(The Aggregate Handbook, 1991)

Table D
Common Equipment Sound Levels

EQUIPMENT	**DECIBEL LEVEL**	**DISTANCE** in feet
Augered earth drill	80	50
Backhoe	83-86	50
Cement mixer	63-71	50
Chain saw cutting trees	75-81	50
Compressor	67	50
Garbage Truck	71-83	50
Jackhammer	82	50
Paving breaker	82	50
Wood Chipper	89	50
Bulldozer	80	50
Grader	85	50
Truck	91	50
Generator	78	50
Rock drill	98	50

(excerpt and derived from Cowan, 1994)

Table E



(The Aggregate Handbook, 1991)

The sound level at receptor locations should be calculated using the inverse square rule whereby sound is attenuated over distance. Again, each doubling of the distance from the source of a noise decreases the SPL by 6 dB(A) at distances greater than 50 feet. This calculation should first consider the straight line distance between the point of noise generation and the point of noise reception with the presumption that no natural or manmade features exist along the transect between the two points that would further attenuate sound level. Calculations should be performed for each point of reception in all directions being careful to evaluate the worst case noise impact potential by considering activities at the point where they would be closest to a receptor. The sound level calculated for the point of reception should be related to ambient sound levels. Ambient sound levels can be either measured or assumed based on established references for the environmental setting and land use at the point of reception. For estimation purposes, ambient SPLs will vary from approximately 35 dB(A) in a wilderness area to approximately 87 dB(A) in a highly industrial setting. A quiet seemingly serene setting such as rural farm land will be at the lower end of the scale at about 45 dB(A), whereas an urban industrial area will be at the high end of this scale at around 79 dB(A) (EPA 550/9-79-100, November 1978). If there is any concern that levels based on reference values do not accurately reflect ambient SPL, field measurements should be undertaken to determine ambient SPLs.

Where this evaluation indicates that sound levels at the point of reception will not be perceptible, similar to or only slightly elevated as compared to ambient conditions, no further evaluation is required. When there is an indication from this initial analysis that marginal or significant noise impact may occur, further evaluation is required. In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive. (see B.1.a Evaluation of Sound Characteristics)

4. Second Level Noise Impact Evaluation

Further refine the evaluation of noise impact potential by factoring in any additional noise attenuation that will be provided by existing natural topography, fabricated structures such as buildings, walls or berms or vegetation located between the point of noise generation and noise reception. This analysis may require consideration of future conditions and the loss of natural noise buffers over time.

Dense vegetation that is at least 100 feet in depth will reduce the sound levels by 3 to 7 dB(A). Evergreens provide a better vegetative screen than deciduous trees. Keep in mind that if a vegetative screen does not currently exist, planting a vegetative screen may require 15 or more years of growth before it becomes effective.

The degree to which topography attenuates noise depends on how close the feature is located to the source or the receptor of the noise. Topography can act as a natural screen. The closer a hill or other barrier is to the noise source or the receptor, the larger the sound shadow will be on the side opposite the noise source. Certain operations such as mining and landfills may be able to use topography to maintain a screen between the operation and receptors as they progress. Mining operations may be able to create screens by opening a mine in the center of the site using and maintaining the pit walls as barriers against sound (Aggregate Handbook, 1991).

If after taking into account all the attenuating features the potential still exists for adverse noise impact, other types of noise analyses or modeling should be used to characterize the source. An Equivalent Sound Level (L_{eq}) analysis or a related type of noise analysis may better define activities or sources that require more mitigation or isolation so that noise emanating from these sources will not cause an adverse impact.

Where it is demonstrated that noise absorbing or deflecting features further attenuate sound reception to a level of no significant increase, no further analysis is necessary. Where it is determined that noise level or the character of the noise may

have a significant adverse effect on receptors, other noise mitigation measures should be evaluated in an expanded noise analysis.

5. Third Level - Mitigation Measures

When the above analyses indicate significant noise effects may or will occur, the applicant should evaluate options for implementation of mitigation measures that avoid, or diminish significant noise effects to acceptable levels (see Section V.C. Mitigation - Best Management Practices). Adequate details concerning mitigation measures and an evaluation of the effectiveness of the mitigative measures through additional sound level calculations should be provided in a noise analysis. These calculations are to factor in the noise reduction or avoidance capabilities of the mitigation measures. In circumstances where noise effects cannot readily be reduced to a level of no significance by project design or operational features in the application, the applicant must evaluate alternatives and mitigation measures in an environmental impact statement to avoid or reduce impacts to the maximum extent practicable per the requirements of the State Environmental Quality Review Act (SEQR).

The noise analysis should be part of the application or a supplement to it, and will be part of the SEQR environmental assessment by reference. Duplicative noise analysis information is not required for the permit application and the assessment of impacts under SEQR. A proper analysis can satisfy information needs for both purposes.

C. Mitigation - Best Management Practices (BMP) for Reducing Noise

Various noise abatement techniques are available for reducing frequency of sound, duration of sound or SPLs at receptor locations. The mitigation techniques given below are listed according to what sound characteristic they mitigate.

1. Reduce noise frequency and impulse noise at the source of generation by:

   a. Replacing back-up beepers on machinery with strobe lights (subject to other requirements, e.g., OSHA and Mine Safety and Health Administration, as applicable). This eliminates the most annoying impulse beeping;

   b. Using appropriate mufflers to reduce the frequency of sound on machinery that pulses, such as diesel engines and compressed air machinery;

   c. Changing equipment: using electric motors instead of compressed air driven machinery; using low speed fans in place of high speed fans;

   d. Modifying machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces; and

2. Reduce noise duration by:

   a. Limiting the number of days of operation, restricting the hours of operation and specifying the time of day and hours of access and egress can abate noise impacts.

   b. Limiting noisier operations to normal work day hours may reduce or eliminate complaints.

Limiting hours of construction or operation can be an effective tool in reducing potential adverse impacts of noise. The impacts of noise on receptors can be

significantly reduced by effectively managing the hours at which the loudest of the operations can take place.

Implementation of hours of operation does not reduce the SPL emanating from a facility. Determining whether or not hours of operation will be effective, mitigation requires consideration of: public safety, for example road construction at night may reduce traffic concerns and facilitate work; duration of the activity, is it a one time event necessary to meet a short term goal or will the activity become an ongoing operation; and surrounding land use, consider what type(s) of land use is proximal to the activity and at what time(s) might a reduction of noise levels be necessary. There may be other factors to consider due to the uniqueness of a given activity or the type of land use adjacent to the activity. Hours of operation should also consider weekend activities and legal holidays that may change the types of land use adjacent to the permitted activity or increase traffic levels in an area.

The best results from using hours of operation as a mitigative measure will be obtained if the hours are negotiated with the owner or operator of the facility. The less noisy aspects of an operation may not have to be subject to the requirements of hours of operation such as preparing, greasing and maintaining machinery for the upcoming day's operation. The more noisy operations can be scheduled to begin when people in the receptor area are less likely to be adversely effected. Hours of operation should be included in the operation plans for a facility that becomes part of the permit, or in the event that there is no operation plan, can be included as a permit condition.

3. Reduce Noise sound pressure levels by:

   a. Increasing the setback distance.
   b. Moving processing equipment during operation further from receptors.
   c. Substituting quieter equipment (example - replacing compressed air fan with an electric fan could result in a 20 dB reduction of noise level).

d. Using mufflers selected to match the type of equipment and air or gas flow on mechanical equipment.
e. Ensuring that equipment is regularly maintained.
f. Enclosing processing equipment in buildings (example - enclosing noisy equipment could result in an 8-10 dB noise level reduction, a 9 inch brick wall can reduce SPL by 45-50 dB).
g. Erecting sound barriers such as screens or berms around the noise generating equipment or near the point of reception. The angle of deflection also increases as the height of a screen or barrier increases. Screens or barriers should be located as close to the noise source or the receptor as possible. The closer the barrier is located to the source or the receptor, the greater the angle of deflection of the sound waves will be creating a larger "sound shadow" on the side opposite the barrier. Stockpiles of raw material or finished product can be an effective sound barrier if strategically placed.
h. phasing operations to preserve natural barriers as long as possible.
i. altering the direction, size, proximity of expanding operations.
j. Designing enclosed facilities to prevent or minimize an SPL increases above ambient levels. This would require a noise analysis and building designed by a qualified engineer that includes adequate ventilation with noise abatement systems on the ventilation system.

Public notification of upcoming loud events can also be used as a form of mitigation although it doesn't fit easily into the categories above. People are less likely to get upset if they know of an upcoming event and know that it will be temporary.

The applicant should demonstrate that the specific mitigation measures proposed will be effective in preventing adverse noise effects on receptors.

D. Decision Making - Conditioning Permits to Limit Noise Impacts

Preferably, the mitigation measures as outlined in the construction and operational plans should be relied upon to mitigate the effects of noise on receptors. The permit should state that the activity will be conducted in accordance with the approved plan. Otherwise, mitigation measures and BMP's can be imposed within specific permit conditions.

It is not the intention of this guidance to require decibel limits to be established for operations where such limits are not required by regulation. There are, however, instances when a decibel limit may be established for an operation to ensure activities do not create unacceptable noise effects, as follows:

1. The review of a draft and final environmental impact statement demonstrates the need for imposition of a decibel limit;
2. A decibel limit is established by the Commissioner's findings after a public hearing has been held on an application;
3. The applicant asks to have a decibel limit to demonstrate the ability to comply; or
4. A program division seeks to establish a decibel limit as a permit condition, when necessary to demonstrate avoidance of unacceptable noise impact.

Ultimately, the final decision must incorporate appropriate measures to minimize or avoid significant noise impacts, as required under SEQR. Any unavoidable adverse effects must be weighed along with other social and economic considerations in deciding whether to approve or deny a permit.

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Additional Reading

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APPENDIX B -
INSTRUMENT CALIBRATION SHEETS

635

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 5392
Description Quest QC-10 Acoustic Calibrator
Calibrated 5/26/2022

Manufacturer Quest
Model Number QC-10
Serial Number QID050172
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 35

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

CASELLA

Certificate of Conformity and Calibration FA05190

Instrument Type:-	**CEL-633C**
Serial Number	4210504
Firmware revision	V006-05
Microphone Type:-	**CEL-251**
Serial Number	05084
Preamplifier Type:-	**CEL-495**
Serial Number	005056
Instrument Class/Type:-	1



Applicable standards:-

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- *The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	**Test Engineer:-**	Nicola Cartwright
	32 %RH	**Date of Issue:-**	July 4, 2022
	1014 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

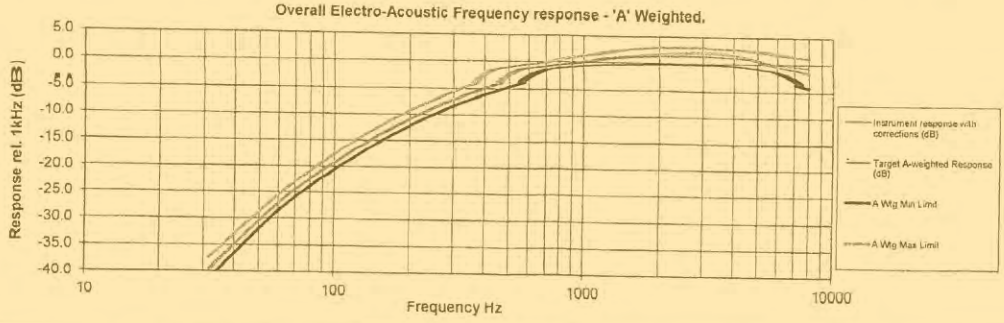
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - *A Weighted*

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 17320
Description Quest SoundPro DL-2-1/3
Calibrated 5/27/2022

Manufacturer Quest
Model Number SoundPro DL-2-1/3
Serial Number BIJ090026
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 40

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

				(As Of Cal Entry Date)	
Test Instrument ID	Description	Manufacturer	Serial Number	Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

Certificate of Conformity and Calibration



Instrument Model:-	CEL-633C		
Serial Number	0442231		
Firmware revision	V129-09		
Microphone Type:-	CEL-252	Preamplifier Type:-	CEL-495
Serial Number	89713	Serial Number	001775
Instrument Class/Type:-	2		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	Test Engineer:-	Paul Blackwell
	25 %RH	Date of Issue:-	December 22, 2021
	1015 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

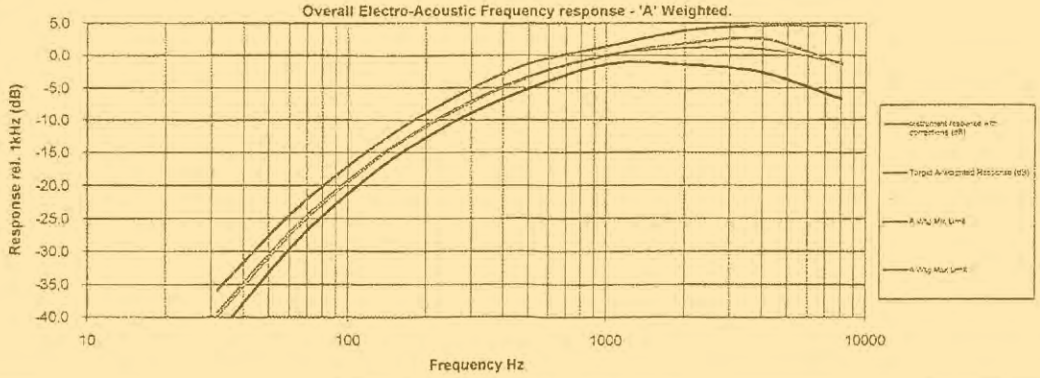
Test Summary:-

Self Generated Noise Test	All Tests Pass
Electrical Signal Test Of Frequency Weightings	All Tests Pass
Frequency & Time Weightings At 1 kHz	All Tests Pass
Level Linearity On The Reference Level Range	All Tests Pass
Toneburst Response Test	All Tests Pass
C-peak Sound Levels	All Tests Pass
Overload Indication	All Tests Pass
Acoustic Tests	All Tests Pass

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	4637949		
Firmware revision	V129-09		
Microphone Type:-	**CEL-252**	**Preamplifier Type:-**	**CEL-495**
Serial Number	60590	Serial Number	002125
Instrument Class/Type:-	**2**		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	23 °C 33 %RH 1021 mBar	**Test Engineer:-** **Date of Issue:-**	Paul Blackwell December 14, 2021

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

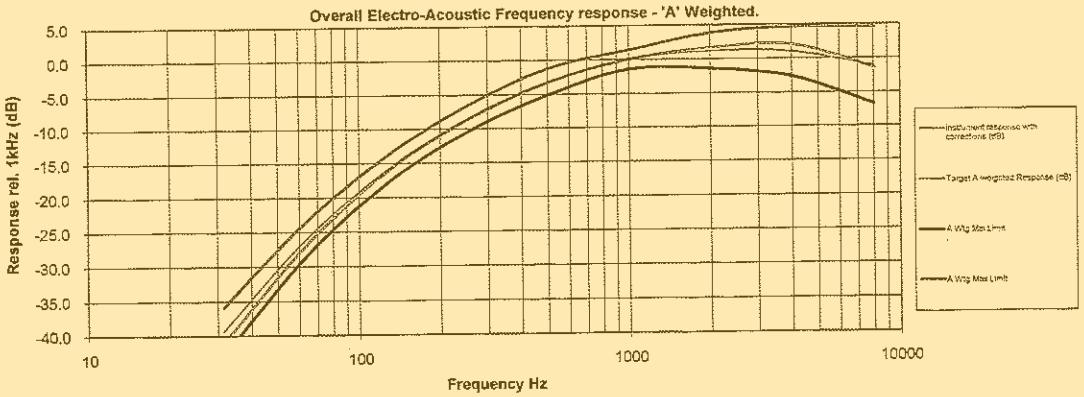
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Email: info@casellasolutions.cn

Certificate of Conformity and Calibration



Instrument Model:- CEL-633C

Serial Number 2145334
Firmware revision V129-09

Microphone Type:- CEL-251
Serial Number 5766

Preamplifier Type:- CEL-495
Serial Number 004239

Instrument Class/Type:- 1

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-

23 °C
29 %RH
999 mBar

Test Engineer:- Paul Blackwell
Date of Issue:- April 12, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

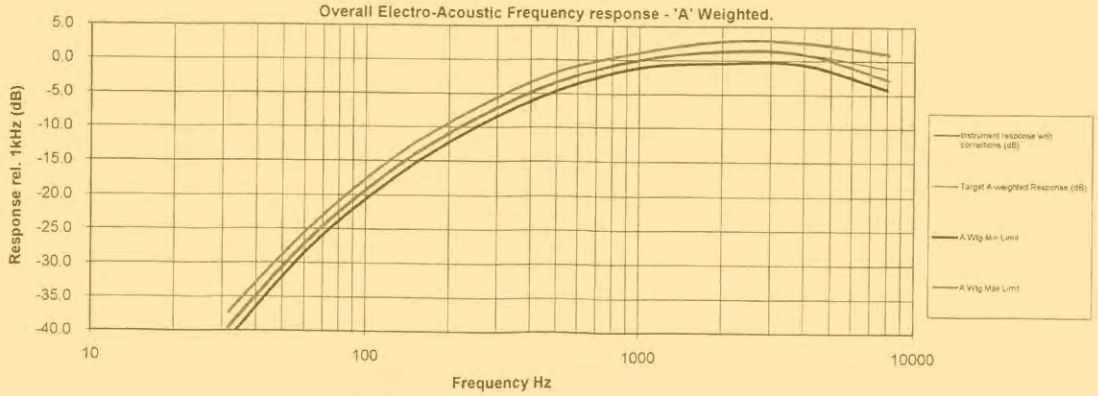
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Email: info@casellasolutions.cn

CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-120/1
Serial Number:	5230919
Job Number:	25508
Date of Issue:	12-Apr-2022
Engineer:	P Blackwell

Traceable Equipment:		
	Reference Calibrator	EQ11085
	DVM type Fluke 45	EQ00318

Test Conditions:

Ambient Temperature	23.0	°C
Ambient Humidity	29.0	%RH
Ambient Pressure	999	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.04 dB	N/A dB	1.0000 kHz
Final Reading	114.00 dB	N/A dB	1.0000 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

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APPENDIX C - PHOTO LOG

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Photo 1: M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad.



Photo 2: M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad.



Photo 3: M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad.



Photo 4: M-4 – Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad.



Photo 5: M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad.

APPENDIX D - MODEL DATA

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SOUND SOURCE

SOURCE	SOUND POWER LEVEL dB	SOUND POWER LEVEL dB(A)	HEIGHT ABOVE GROUND (m)
M109A3GN (155 mm) Howitzer	180.8	163.2	2
40 Ton Haul Truck	117.6	115.7	2

MODEL CONFIGURATION

MODEL PARAMETER	SETTINGS
Atmospheric Absorption	20°C / 70% Humidity
Ground Absorption	0.7G Ground Factor
Receiver Height	1.5 meters for sound level isolines and receivers
Model Radius	3,218 m

MODELED SOUND LEVEL AT RECEIVERS

M 109 No Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	75	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	107	1.5

M 109 with Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	67	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	100	1.5

40-Ton Haul Truck No Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	44	1.5
M-2	20	1.5
M-3	33	1.5
M-4	33	1.5
M-5	60	1.5

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APPENDIX E –
2022 BALLISTICS TEST RANGE SOUND ANALYSES SCOPE OF WORK

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H2H GEOSCIENCE ENGINEERING
Environmental Professionals
Geologic Consultants
Construction Services

179 River Street, Troy, New York 12180
(518) 270-1620/Fax (518) 270-1672

November 9, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analysis at the above reference site.

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following Scope of Work (SOW).

Scope of Work

H2H intends to collect ambient (no unapproved UCI operations taking place) sound levels, as well has additional sound level modeling to support a revised sound study, to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application.

Task 1: Sound Level Monitoring

H2H has developed a Site Overview Map (Figure 1) showing all identified receptors within a two-mile radius (Project Area) of the ballistics testing Firing Pad. The Firing Pad (100 ft. by 100 ft.) is in the northeast corner of parcel 38.1-1-31.000 (UCI Site). The Control Operations Area is located adjacent to the Firing Pad; the Target Area is located 590 ft. west of the Firing Pad (Figure 2).

Forty-two Residential Receptors (occupied residential structure) were identified with the two-mile radius. Four parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius.

Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Firing Pad to best determine ambient sound level conditions in the Project Area. H2H will conduct sound level monitoring at each of the identified five-monitoring location (Figure 1) to identify, and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for the area surrounding each monitoring location.

The following is a description of each sound monitoring location:

M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-2 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surround Pulsifer Rd.

M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

M-4 - Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Task 2: Sound Level Modeling

Based on source sound level data (loudest kinetic systems to be tested) provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURES

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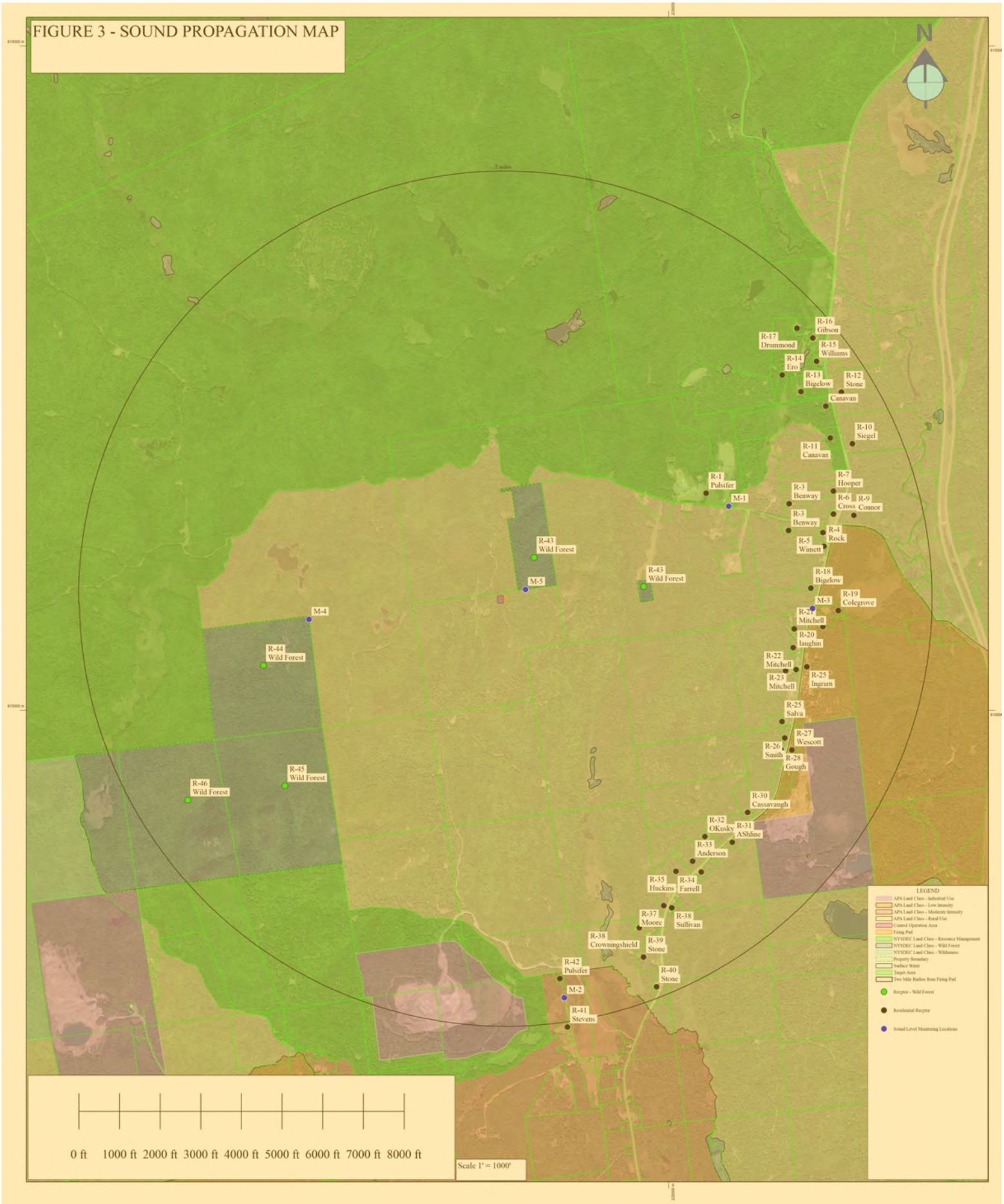
FIGURE 3 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
R-7 Hooper
R-3 Benway
M-1
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
R-43 Wild Forest
M-5
R-18 Bigelow
M-3
R-19 Colegrove
M-4
R-21 Mitchell
R-20 laughin
R-44 Wild Forest
R-22 Mitchell
R-25 Ingram
R-23 Mitchell
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-42 Pulsifer
R-40 Stone
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Receptor - Wild Forest
Residential Receptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1" = 1000'

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FIGURE - 2 SITE MAP



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APPENDIX F –
INPUT DATA and RESULTS of SOUND PROPGATION MODELS

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Noise Mapping Results 40 ton haul truck / No Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
M-1	1.5	44.39		21.03	19.76	23.27	35.13	42.26	38.29	23.78	-20.33
M-2	1.5	20.1		6.99	7.74	10.78	16.84	14.8	-0.03	-49.88	-225.27
M-3	1.5	32.75		14.6	12.56	16.68	26.08	30.73	23.04	-3.93	-95.95
M-4	1.5	32.8		12.96	14.15	18.5	27.88	29.95	22.73	-2.68	-87.75
M-5	1.5	60.42		32.52	36.21	37.12	49.88	57.52	55.59	48.12	31.51
Test Point	1.5	56.47		29.62	32.37	33.48	46.17	53.74	51.49	42.89	21.99

*** Receiver Results - Sources Analysis ***

Receiver Name	Point	Point-2	Point-3
M-1 [1.5m]	44.36	21.12	17.91
M-2 [1.5m]	12.74	16.13	16.29
M-3 [1.5m]	32.37	19.64	18.25
M-4 [1.5m]	18.79	28.99	30.17
M-5 [1.5m]	21.75	59.97	50.33
Test Point [1.5m]	14.09	55.98	46.69

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-1	Point	670.31	224.5	254.58	63	109	-67.53	-0.06	5.53	0	-	-	-	0	-26.2	20.74
M-1	Point	670.31	224.5	254.58	125	107	-67.53	-0.23	-3.86	0	-	-	-	0	-16.1	19.29
M-1	Point	670.31	224.5	254.58	250	107	-67.53	-0.76	-7.46	0	-	-	-	0	-8.6	22.66
M-1	Point	670.31	224.5	254.58	500	111	-67.53	-1.88	-3.38	0	-	-	-	0	-3.2	35.02
M-1	Point	670.31	224.5	254.58	1000	112	-67.53	-3.34	1.1	0	-	-	-	0	0	42.24
M-1	Point	670.31	224.5	254.58	2000	109	-67.53	-6.04	1.66	0	-	-	-	0	1.2	38.29
M-1	Point	670.31	224.5	254.58	4000	104	-67.53	-15.36	1.66	0	-	-	-	0	1	23.78
M-1	Point	670.31	224.5	254.58	8000	98	-67.53	-51.36	1.66	0	-	-	-	0	-1.1	-20.33
M-1	Point-2	1824.41	224.5	421.6	63	109	-76.22	-0.16	5.83	-5.55	-5.55	-	-	0	-26.2	6.69
M-1	Point-2	1824.41	224.5	421.6	125	107	-76.22	-0.62	-5.49	-0.84	-0.84	-	-	0	-16.1	7.72
M-1	Point-2	1824.41	224.5	421.6	250	107	-76.22	-2.07	-7.37	-0.17	-0.17	-	-	0	-8.6	12.57
M-1	Point-2	1824.41	224.5	421.6	500	111	-76.22	-5.1	-3.29	-5.95	-5.95	-	-	0	-3.2	17.23
M-1	Point-2	1824.41	224.5	421.6	1000	112	-76.22	-9.08	1.19	-11.4	-11.4	-	-	0	0	16.48
M-1	Point-2	1824.41	224.5	421.6	2000	109	-76.22	-16.45	1.75	-13.92	-13.92	-	-	0	1.2	5.36
M-1	Point-2	1824.41	224.5	421.6	4000	104	-76.22	-41.8	1.75	-16.65	-16.65	-	-	0	1	-27.93
M-1	Point-2	1824.41	224.5	421.6	8000	98	-76.22	-139.79	1.75	-19.52	-19.52	-	-	0	-1.1	-136.88
M-1	Point-3	1908.29	224.5	408.01	63	109	-76.61	-0.17	5.83	-6.58	-6.58	-	-	0	-26.2	5.27
M-1	Point-3	1908.29	224.5	408.01	125	107	-76.61	-0.65	-5.49	-2.36	-2.36	-	-	0	-16.1	5.79
M-1	Point-3	1908.29	224.5	408.01	250	107	-76.61	-2.16	-7.37	-2.27	-2.27	-	-	0	-8.6	9.99
M-1	Point-3	1908.29	224.5	408.01	500	111	-76.61	-5.34	-3.29	-8.58	-8.58	-	-	0	-3.2	13.98
M-1	Point-3	1908.29	224.5	408.01	1000	112	-76.61	-9.5	1.19	-14.43	-14.43	-	-	0	0	12.65
M-1	Point-3	1908.29	224.5	408.01	2000	109	-76.61	-17.21	1.75	-17.2	-17.2	-	-	0	1.2	0.93
M-1	Point-3	1908.29	224.5	408.01	4000	104	-76.61	-43.72	1.75	-20.09	-20.09	-	-	0	1	-33.67
M-1	Point-3	1908.29	224.5	408.01	8000	98	-76.61	-146.22	1.75	-23.03	-23.03	-	-	0	-1.1	-147.21
M-2	Point	3847.96	223.45	254.58	63	109	-82.7	-0.35	5.92	-4.77	-4.77	-	-	0	-26.2	0.9
M-2	Point	3847.96	223.45	254.58	125	107	-82.7	-1.31	-5.46	0	0.69	-	-	0	-16.1	1.43
M-2	Point	3847.96	223.45	254.58	250	107	-82.7	-4.36	-7.34	0	2.57	-	-	0	-8.6	4
M-2	Point	3847.96	223.45	254.58	500	111	-82.7	-10.77	-3.26	-1.51	-1.51	-	-	0	-3.2	9.56
M-2	Point	3847.96	223.45	254.58	1000	112	-82.7	-19.15	1.22	-4.77	-4.77	-	-	0	0	6.59
M-2	Point	3847.96	223.45	254.58	2000	109	-82.7	-34.7	1.78	-4.77	-4.77	-	-	0	1.2	-10.2
M-2	Point	3847.96	223.45	254.58	4000	104	-82.7	-88.16	1.78	-4.77	-4.77	-	-	0	1	-68.86
M-2	Point	3847.96	223.45	254.58	8000	98	-82.7	-294.83	1.78	-4.77	-4.77	-	-	0	-1.1	-283.63
M-2	Point-2	3033.08	223.45	421.6	63	109	-80.64	-0.27	5.9	-4.92	-4.92	-	-	0	-26.2	2.87
M-2	Point-2	3033.08	223.45	421.6	125	107	-80.64	-1.03	-5.47	0	0.41	-	-	0	-16.1	3.76
M-2	Point-2	3033.08	223.45	421.6	250	107	-80.64	-3.43	-7.35	0	2.02	-	-	0	-8.6	6.98
M-2	Point-2	3033.08	223.45	421.6	500	111	-80.64	-8.49	-3.27	-2.56	-2.56	-	-	0	-3.2	12.85
M-2	Point-2	3033.08	223.45	421.6	1000	112	-80.64	-15.1	1.21	-6.68	-6.68	-	-	0	0	10.8
M-2	Point-2	3033.08	223.45	421.6	2000	109	-80.64	-27.35	1.77	-7.99	-7.99	-	-	0	1.2	-4.01
M-2	Point-2	3033.08	223.45	421.6	4000	104	-80.64	-69.49	1.77	-9.82	-9.82	-	-	0	1	-53.19
M-2	Point-2	3033.08	223.45	421.6	8000	98	-80.64	-232.4	1.77	-12.1	-12.1	-	-	0	-1.1	-226.46
M-2	Point-3	3157.54	223.45	408.01	63	109	-80.99	-0.28	5.9	-4.8	-4.8	-	-	0	-26.2	2.63
M-2	Point-3	3157.54	223.45	408.01	125	107	-80.99	-1.07	-5.47	0	0.65	-	-	0	-16.1	3.37
M-2	Point-3	3157.54	223.45	408.01	250	107	-80.99	-3.58	-7.35	0	2.47	-	-	0	-8.6	6.49
M-2	Point-3	3157.54	223.45	408.01	500	111	-80.99	-8.83	-3.27	-1.7	-1.7	-	-	0	-3.2	13.01
M-2	Point-3	3157.54	223.45	408.01	1000	112	-80.99	-15.72	1.21	-5.16	-5.16	-	-	0	0	11.35
M-2	Point-3	3157.54	223.45	408.01	2000	109	-80.99	-28.47	1.77	-5.52	-5.52	-	-	0	1.2	-3.01
M-2	Point-3	3157.54	223.45	408.01	4000	104	-80.99	-72.34	1.77	-6.16	-6.16	-	-	0	1	-52.72
M-2	Point-3	3157.54	223.45	408.01	8000	98	-80.99	-241.93	1.77	-7.21	-7.21	-	-	0	-1.1	-231.46
M-3	Point	1562.38	204.5	254.58	63	109	-74.88	-0.14	5.8	0	-	-	-	0	-26.2	13.58
M-3	Point	1562.38	204.5	254.58	125	107	-74.88	-0.53	-5.49	0	-	-	-	0	-16.1	10
M-3	Point	1562.38	204.5	254.58	250	107	-74.88	-1.77	-7.38	0	-	-	-	0	-8.6	14.38
M-3	Point	1562.38	204.5	254.58	500	111	-74.88	-4.37	-3.3	0	-	-	-	0	-3.2	25.25
M-3	Point	1562.38	204.5	254.58	1000	112	-74.88	-7.78	1.18	0	-	-	-	0	0	30.53
M-3	Point	1562.38	204.5	254.58	2000	109	-74.88	-14.09	1.74	0	-	-	-	0	1.2	22.98
M-3	Point	1562.38	204.5	254.58	4000	104	-74.88	-35.8	1.74	0	-	-	-	0	1	-3.93
M-3	Point	1562.38	204.5	254.58	8000	98	-74.88	-119.71	1.74	0	-	-	-	0	-1.1	-95.95
M-3	Point-2	2315.51	204.5	421.6	63	109	-78.29	-0.21	5.86	-5.11	-5.11	-	-	0	-26.2	5.05
M-3	Point-2	2315.51	204.5	421.6	125	107	-78.29	-0.79	-5.48	0	0.06	-	-	0	-16.1	6.34
M-3	Point-2	2315.51	204.5	421.6	250	107	-78.29	-2.62	-7.36	0	1.37	-	-	0	-8.6	10.13
M-3	Point-2	2315.51	204.5	421.6	500	111	-78.29	-6.48	-3.28	-3.66	-3.66	-	-	0	-3.2	16.09
M-3	Point-2	2315.51	204.5	421.6	1000	112	-78.29	-11.53	1.2	-8.37	-8.37	-	-	0	0	15.01
M-3	Point-2	2315.51	204.5	421.6	2000	109	-78.29	-20.88	1.76	-10.31	-10.31	-	-	0	1.2	2.48
M-3	Point-2	2315.51	204.5	421.6	4000	104	-78.29	-53.05	1.76	-12.67	-12.67	-	-	0	1	-37.26
M-3	Point-2	2315.51	204.5	421.6	8000	98	-78.29	-177.42	1.76	-15.31	-15.31	-	-	0	-1.1	-172.36
M-3	Point-3	2450.06	204.5	408.01	63	109	-78.78	-0.22	5.87	-5.21	-5.21	-	-	0	-26.2	4.46
M-3	Point-3	2450.06	204.5	408.01	125	107	-78.78	-0.83	-5.48	-0.13	-0.13	-	-	0	-16.1	5.68
M-3	Point-3	2450.06	204.5	408.01	250	107	-78.78	-2.77	-7.36	0	1.05	-	-	0	-8.6	9.49
M-3	Point-3	2450.06	204.5	408.01	500	111	-78.78	-6.86	-3.28	-4.15	-4.15	-	-	0	-3.2	14.73
M-3	Point-3	2450.06	204.5	408.01	1000	112	-78.78	-12.2	1.2	-9.07	-9.07	-	-	0	0	13.16
M-3	Point-3	2450.06	204.5	408.01	2000	109	-78.78	-22.09	1.76	-11.18	-11.18	-	-	0	1.2	-0.1
M-3	Point-3	2450.06	204.5	408.01	4000	104	-78.78	-56.13	1.76	-13.67	-13.67	-	-	0	1	-41.82
M-3	Point-3	2450.06	204.5	408.01	8000	98	-78.78	-187.73	1.76	-16.39	-16.39	-	-	0	-1.1	-184.24
M-4	Point	2712.58	461.64	254.58	63	109	-79.67	-0.24	5.88	-4.83	-4.83	-	-	0	-26.2	3.94
M-4	Point	2712.58	461.64	254.58	125	107	-79.67	-0.92	-5.47	0	0.59	-	-	0	-16.1	4.84
M-4	Point	2712.58	461.64	254.58	250	107	-79.67	-3.07	-7.35	0	2.36	-	-	0	-8.6	8.31
M-4	Point	2712.58	461.64	254.58	500	111	-79.67	-7.59	-3.27	-1.94	-1.94	-	-	0	-3.2	15.34
M-4	Point	2712.58	461.64	254.58	1000	112	-79.67	-13.5	1.21	-5.6	-5.6	-	-	0	0	14.43
M-4	Point	2712.58	461.64	254.58	2000	109	-79.67	-24.46	1.77	-6.3	-6.3	-	-	0	1.2	1.54
M-4	Point	2712.58	461.64	254.58	4000	104	-79.67	-62.15	1.77	-7.43	-7.43	-	-	0	1	-42.48
M-4	Point	2712.58	461.64	254.58	8000	98	-79.67	-207.84	1.77	-9.07	-9.07	-	-	0	-1.1	-197.91
M-4	Point-2	1525.05	461.64	421.6	63	109	-74.67	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	9.02
M-4	Point-2	1525.05	461.64	421.6	125	107	-74.67	-0.52	-5.49	0	0.72	-	-	0	-16.1	10.23
M-4	Point-2	1525.05	461.64	421.6	250	107	-74.67	-1.73	-7.38	0	2.61	-	-	0	-8.6	14.63
M-4	Point-2	1525.05	461.64	421.6	500	111	-74.67	-4.27	-3.3	-1.47	-1.47	-	-	0	-3.2	24.1
M-4	Point-2	1525.05	461.64	421.6	1000	112	-74.67	-7.59	1.18	-4.77	-4.77	-	-	0	0	26.15
M-4	Point-2	1525.05	461.64	421.6	2000	109	-74.67	-13.75	1.74	-4.77	-4.77	-	-	0	1.2	18.75
M-4	Point-2	1525.05	461.64	421.6	4000	104	-74.67	-34.94	1.74	-4.77	-4.77	-	-	0	1	-7.64
M-4	Point-2	1525.05	461.64	421.6	8000	98	-74.67	-116.85	1.74	-4.77	-4.77	-	-	0	-1.1	-97.65
M-4	Point-3	1410.76	461.64	408.01	63	109	-73.99	-0.13	5.78	-4.77	-4.77	-	-	0	-26.2	9.69
M-4	Point-3	1410.76	461.64	408.01	125	107	-73.99	-0.48	-5.48	0	0.71	-	-	0	-16.1	10.95
M-4	Point-3	1410.76	461.64	408.01	250	107	-73.99	-1.6	-7.38	0	2.61	-	-	0	-8.6	15.43
M-4	Point-3	1410.76	461.64	408.01	500	111	-73.99	-3.95	-3.3	-1.47	-1.47	-	-	0	-3.2	25.09
M-4	Point-3	1410.76	461.64	408.01	1000	112	-73.99	-7.02	1.18	-4.77	-4.77	-	-	0	0	27.39
M-4	Point-3	1410.76	461.64	408.01	2000	109	-73.99	-12.72	1.73	-4.77	-4.77	-	-	0	1.2	20.45
M-4	Point-3	1410.76	461.64	408.01	4000	104	-73.99	-32.32	1.73	-4.77	-4.77	-	-	0	1	-4.35
M-4	Point-3	1410.76	461.64	408.01	8000	98	-73.99	-108.09	1.73	-4.77	-4.77	-	-	0	-1.1	-88.22
M-5	Point	1153.41	419.14	254.58	63	109	-72.24	-0.1	5.72	-8.13	-8.13	-	-	0	-26.2	8.05
M-5	Point	1153.41	419.14	254.58	125	107	-72.24	-0.39	-5.36	-4.63	-4.63	-	-	0	-16.1	8.28
M-5	Point	1153.41	419.14	254.58	250	107	-72.24	-1.31	-7.4	-4.9	-4.9	-	-	0	-8.6	12.55
M-5	Point	1153.41	419.14	254.58	500	111	-72.24	-3.23	-3.32	-11.59	-11.59	-	-	0	-3.2	17.42
M-5	Point	1153.41	419.14	254.58	1000	112	-72.24	-5.74	1.16	-17.71	-17.71	-	-	0	0	17.47
M-5	Point	1153.41	419.14	254.58	2000	109	-72.24	-10.4	1.72	-20.61	-20.61	-	-	0	1.2	8.67
M-5	Point	1153.41	419.14	254.58	4000	104	-72.24	-26.43	1.72	-23.56	-23.56	-	-	0	1	-15.51
M-5	Point	1153.41	419.14	254.58	8000	98	-72.24	-88.38	1.72	-25	-25	-	-	0	-1.1	-87
M-5	Point-2	154.71	419.14	421.6	63	109	-54.79	-0.01	3.96	0	-	-	-	0	-26.2	31.96
M-5	Point-2	154.71	419.14	421.6	125	107	-54.79	-0.05	-0.34	0	-	-	-	0	-16.1	35.71
M-5	Point-2	154.71	419.14	421.6	250	107	-54.79	-0.18	-7.51	0	-	-	-	0	-8.6	35.92
M-5	Point-2	154.71	419.14	421.6	500	111	-54.79	-0.43	-3.62	0	-	-	-	0	-3.2	48.96
M-5	Point-2	154.71	419.14	421.6	1000	112	-54.79	-0.77	0.66	0	-	-	-	0	0	57.1
M-5	Point-2	154.71	419.14	421.6	2000	109	-54.79	-1.39	1.19	0	-	-	-	0	1.2	55.2
M-5	Point-2	154.71	419.14	421.6	4000	104	-54.79	-3.54	1.19	0	-	-	-	0	1	47.85
M-5	Point-2	154.71	419.14	421.6	8000	98	-54.79	-11.85	1.19	0	-	-	-	0	-1.1	31.44
M-5	Point-3	268.37	419.14	408.01	63	109	-59.57	-0.02	4.83	-4.77	-4.77	-	-	0	-26.2	23.26
M-5	Point-3	268.37	419.14	408.01	125	107	-59.57	-0.09	-0.85	-3.93	-3.93	-	-	0	-16.1	26.46
M-5	Point-3	268.37	419.14	408.01	250	107	-59.57	-0.3	-7.63	0	2.85	-	-	0	-8.6	30.9
M-5	Point-3	268.37	419.14	408.01	500	111	-59.57	-0.75	-3.57	-1.21	-1.21	-	-	0	-3.2	42.7
M-5	Point-3	268.37	419.14	408.01	1000	112	-59.57	-1.34	0.89	-4.77	-4.77	-	-	0	0	47.21
M-5	Point-3	268.37	419.14	408.01	2000	109	-59.57	-2.42	1.45	-4.77	-4.77	-	-	0	1.2	44.88
M-5	Point-3	268.37	419.14	408.01	4000	104	-59.57	-6.15	1.45	-4.77	-4.77	-	-	0	1	35.95
M-5	Point-3	268.37	419.14	408.01	8000	98	-59.57	-20.56	1.45	-4.78	-4.78	-	-	0	-1.1	13.43
Test Point	Point	1132.57	424.34	254.58	63	109	-72.08	-0.1	5.72	-15.33	-15.33	-	-	0	-26.2	1.01
Test Point	Point	1132.57	424.34	254.58	125	107	-72.08	-0.38	-5.34	-12.89	-12.89	-	-	0	-16.1	0.2
Test Point	Point	1132.57	424.34	254.58	250	107	-72.08	-1.28	-7.4	-13.78	-13.78	-	-	0	-8.6	3.86
Test Point	Point	1132.57	424.34	254.58	500	111	-72.08	-3.17	-3.32	-20.83	-20.83	-	-	0	-3.2	8.4
Test Point	Point	1132.57	424.34	254.58	1000	112	-72.08	-5.64	1.16	-25	-25	-	-	0	0	10.44
Test Point	Point	1132.57	424.34	254.58	2000	109	-72.08	-10.21	1.72	-25	-25	-	-	0	1.2	4.62
Test Point	Point	1132.57	424.34	254.58	4000	104	-72.08	-25.95	1.72	-25	-25	-	-	0	1	-16.31
Test Point	Point	1132.57	424.34	254.58	8000	98	-72.08	-86.78	1.72	-25	-25	-	-	0	-1.1	-85.24
Test Point	Point-2	234.34	424.34	421.6	63	109	-58.4	-0.02	4.66	0	-	-	-	0	-26.2	29.04
Test Point	Point-2	234.34	424.34	421.6	125	107	-58.4	-0.08	-0.65	0	-	-	-	0	-16.1	31.77
Test Point	Point-2	234.34	424.34	421.6	250	107	-58.4	-0.27	-7.64	0	-	-	-	0	-8.6	32.1
Test Point	Point-2	234.34	424.34	421.6	500	111	-58.4	-0.66	-3.59	0	-	-	-	0	-3.2	45.15
Test Point	Point-2	234.34	424.34	421.6	1000	112	-58.4	-1.17	0.84	0	-	-	-	0	0	53.28
Test Point	Point-2	234.34	424.34	421.6	2000	109	-58.4	-2.11	1.4	0	-	-	-	0	1.2	51.09
Test Point	Point-2	234.34	424.34	421.6	4000	104	-58.4	-5.37	1.4	0	-	-	-	0	1	42.63
Test Point	Point-2	234.34	424.34	421.6	8000	98	-58.4	-17.96	1.4	0	-	-	-	0	-1.1	21.94
Test Point	Point-3	380.37	424.34	408.01	63	109	-62.6	-0.03	5.17	-4.77	-4.77	-	-	0	-26.2	20.56
Test Point	Point-3	380.37	424.34	408.01	125	107	-62.6	-0.13	-1.65	-3.12	-3.12	-	-	0	-16.1	23.4
Test Point	Point-3	380.37	424.34	408.01	250	107	-62.6	-0.43	-7.56	0	2.79	-	-	0	-8.6	27.8
Test Point	Point-3	380.37	424.34	408.01	500	111	-62.6	-1.06	-3.48	-1.29	-1.29	-	-	0	-3.2	39.36
Test Point	Point-3	380.37	424.34	408.01	1000	112	-62.6	-1.89	0.99	-4.77	-4.77	-	-	0	0	43.73
Test Point	Point-3	380.37	424.34	408.01	2000	109	-62.6	-3.43	1.55	-4.77	-4.77	-	-	0	1.2	40.95
Test Point	Point-3	380.37	424.34	408.01	4000	104	-62.6	-8.71	1.55	-4.77	-4.77	-	-	0	1	30.46
Test Point	Point-3	380.37	424.34	408.01	8000	98	-62.6	-29.14	1.55	-4.77	-4.77	-	-	0	-1.1	1.93

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5
Test Point	355.58	-8.26	1.5

Point Sources	x	y	Height	Lw	Hz
Point	1133.26	-813.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000
Point-2	121.26	-6.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000
Point-3	-9.74	-112.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000

Ground Height Points	x	y	Height
-	134.08	295.24	480
-	514.08	-44.76	475

Ground Height Lines	x	y	Height
-	4476.27	2642.71	163
-	4430.44	2830.57	
-	4390.79	2796.89	
-	4201.84	2828.04	
-	4117.14	2864.1	
-	4098.98	2926.24	
-	4059.83	2971.18	
-	4011.51	2892.73	
-	3906.23	2834.88	
-	3824.28	2863.63	
-	3851.44	2784.45	
-	3811.91	2761.54	
-	3781.83	2689.14	
-	3742	2649.37	
-	3749.31	2601.68	
-	3791.18	2563.94	
-	3764.8	2488.74	
-	3773.32	2376.23	

658

-	3743.06	2360.98		
-	3687.72	2389.28		
-	3639.09	2389.21		
-	3535.5	2333.86		
-	3440.6	2250.16		
-	3416.01	2183.17		
-	3364.78	2120.28		
-	3372.67	2100.43		
-	3355.11	2100.73		
-	3388.22	1997.46		
-	3349.65	1865.71		
-	3366.62	1826.87		
-	3391.38	1935.46		
-	3464.55	1963.86		
-	3486.94	2004.47		
-	3519.04	2019.65		
-	3546.25	2121.98		
-	3653.14	2165.99		
-	3671.98	2282.77		
-	3764.26	2303.52		
-	3856.52	2368.63		
-	3940.82	2328.01		
-	3970.3	2287.25		
-	4019.57	2274.47		
-	4022.31	2292.04		
-	4124.68	2342.09		
-	4101.27	2381.59		
-	4107.37	2416.37		
-	4202.15	2523.69		
-	4283.96	2502.63		
-	4357.19	2438.58		
-	4363.94	2332.52		
-	4265.78	2257.63		
-	4178.56	2291.79		
-	4151.03	2283.02		
-	4199.26	2219.83		
-	4167.36	2192.97		
-	4138.45	2094.77		
-	4067.99	2086.64		
-	4063.55	2058.89		
-	4095.48	2017.32		
-	4128.51	2013.63		
-	4138.09	1941.77		
-	4178	1894.95		
-	4165.88	1861.5		
-	4255.87	1615.7		
-	4318.49	1539.34		
-	4382.92	1398.92		
-	4485.41	1294.85		
-	3594.69	3017.68	183	
-	3645.24	2688.77		
-	3613.14	2673.89		
-	3588.39	2622.64		
-	3596.83	2558.97		
-	3572.11	2512.01		
-	3512.54	2496.05		
-	3419.5	2508.32		
-	3373.96	2471.03		
-	3329.68	2386.01		
-	3307.92	2383.31		
-	3312.02	2314.45		
-	3284.28	2210.16		
-	3232.54	2144.41		
-	3184.94	2145.89		
-	3083.34	2043.17		
-	3272.35	2083.34		
-	3269.04	2002.9		
-	3244.3	1991.11		
-	3235.51	1914.5		
-	3207.34	1915.27		
-	3195.96	1871.49		
-	3135.62	1808.15		
-	3165.66	1804.61		
-	3144.44	1776.45		
-	3162.67	1743.88		
-	3083.12	1685.93		
-	3063.16	1693.4		
-	2964.53	1640.22		
-	2870.85	1648.8		
-	2830.17	1605.47		
-	2799.61	1632.88		
-	2750.73	1633.43		
-	2728.07	1601.99		
-	2736.24	1570.55		
-	2717.33	1576.64		
-	2772.53	1483.59		
-	2770.73	1356.54		
-	2786.68	1338.7		
-	2824.25	1350.47		
-	2866.72	1329.11		
-	2896.16	1243.66		
-	2888.14	1125.91		
-	2923.34	1077.52		
-	2956.56	955.85		
-	2996.48	884.09		
-	3106	804.81		
-	3159.44	791.41		
-	3258.78	824.31		
-	3300.04	766.56		
-	3308.9	780.48		
-	3309.72	645.39		
-	3211.17	593.27		
-	3183.95	552.44		
-	3192.45	512.32		
-	3233.64	466.61		
-	3233.39	431.04		
-	3247.93	445.2		
-	3306.57	429.55		
-	3296.6	456.5		
-	3314.19	464.32		
-	3272.53	524.22		
-	3289.52	507.2		
-	3327.76	570.78		
-	3270.88	650.88		
-	3426.14	650.88		
-	3459.02	713.82		
-	3478.57	818.24		
-	3469.96	930.75		
-	3492.7	1027.54		
-	3535.9	1105.11		
-	3572.11	1196.06		
-	3559.09	1259.78		
-	3574.64	1319.83		
-	3538.39	1332.32		
-	3522.64	1284.06		
-	3496.08	1276.34		
-	3342.46	1359.41		
-	3308.89	1402.24		
-	3363.1	1549.61		
-	3364.78	1632.65		
-	3417.19	1713.09		
-	3405.82	1831.54		
-	3506.53	1944.13		
-	3567.49	2087.38		
-	3675.23	2146.6		
-	3699.02	2212.77		
-	3727.21	1934.65		
-	3742.56	1957.08		
-	3753.32	1942.74		
-	3763.88	2097.35		
-	3813.73	1981.13		
-	3802.63	1954.75		
-	3811.49	1808.15		
-	3823.85	1964		
-	3805.88	2268.86		
-	3887.74	2241.66		
-	3899.55	2191.91		
-	3951.71	2185.71		
-	4028.1	2103.3		
-	4037.71	2028.61		
-	4100.34	1975.64		
-	4136.68	1889.99		
-	4108.07	1849.28		
-	4152.96	1821.6		
-	4224.07	1612.55		
-	4299.42	1518.06		
-	4341.39	1399.19		
-	4438.56	1271.46		
-	4485.41	1173.86		
-	4491.51	94.57	183	
-	4491.51	79.63		
-	4473.22	2998.58	183	
-	4431.61	2980.04		
-	4390.07	2913.96		
-	4202.89	2907.86		
-	4159.14	2935.69		
-	4104.34	3020.73		
-	4321.04	3023.78	183	
-	4378.05	2984.28		
-	4417.29	2991.32		
-	4439.62	3023.78		
-	4000.84	4502.06	203	
-	4423.78	3319.94		
-	4435.43	3418.95		
-	4472.71	3383.98		
-	4498.06	3388.71		
-	4506.47	3473.16		
-	4562.81	3528.73		
-	4532.37	3565.33		
-	4532.42	3633.49		
-	4504.93	3635.44		
-	4516.72	3669.66		
-	4479.68	3629.64		
-	4479	3591.78		
-	4430.86	3532.15		
-	4418.05	3482.05		
-	4349.42	3503.21		
-	4265.72	3457.1		
-	4266.82	3514.23		
-	4245.85	3530.27		
-	4309.49	3611.09		
-	4242.64	3674.62		
-	4223.21	3734.98		
-	4192.99	3736.75		
-	4168.94	3842.08		
-	4128.82	3847.37		
-	4065.77	3791.68		
-	4080.47	3767.72		
-	4100.79	3779.66		
-	4107.14	3750.28		
-	4044.76	3740.2		
-	4050.36	3788.82		
-	4022.9	3777.99		
-	4044.76	3820.65		
-	4010.69	3904.69		
-	4067.14	3867.85		
-	4049.03	3813.37		
-	4040.68	3852.52		
-	4027.08	3857.41		
-	4019.16	3804.57		
-	4078.04	3810.67		
-	4078.52	3827.98		
-	4115.66	3822.36		
-	4076.64	3861.98		
-	4076.27	4159.86		
-	4222.78	4327.26		
-	4288.74	4354.41		
-	4092.65	4324.26		
-	4015.7	4317.14		
-	4006.99	4243.27		
-	4061.91	4233.87		
-	4008.27	4260.53		
-	4041.26	4335.29		
-	4036.16	4363.81		
-	4068.37	4386.16		
-	4026.49	4400.39		
-	4075.41	4456.85		
-	4061.56	4486.92		
-	4091.32	4408.65		
-	4060.21	4413.69		
-	4054.84	4439.32		
-	4000.84	4502.06	203	
-	4439.62	3023.78		
-	4417.29	2991.32		
-	4378.05	2984.28		
-	4321.04	3023.78	183	
-	4104.34	3020.73		
-	4159.14	2935.69		
-	4202.89	2907.86		
-	4390.07	2913.96		
-	4431.61	2980.04		
-	4473.22	2998.58	183	
-	4491.51	79.63		
-	4491.51	94.57	183	
-	4485.41	1173.86		
-	4438.56	1271.46		
-	4341.39	1399.19		
-	4299.42	1518.06		
-	4224.07	1612.55		
-	4152.96	1821.6		
-	4108.07	1849.28		
-	4136.68	1889.99		
-	4100.34	1975.64		
-	4037.71	2028.61		
-	4028.1	2103.3		
-	3951.71	2185.71		
-	3899.55	2191.91		
-	3887.74	2241.66		
-	3805.88	2268.86		
-	3823.85	1964		
-	3811.73	1981.13		
-	3802.63	1954.75		
-	3763.88	2097.35		
-	3753.32	1942.74		
-	3742.56	1957.08		
-	3727.21	1934.65		
-	3699.02	2212.77		
-	3675.23	2146.6		
-	3567.49	2087.38		
-	3506.53	1944.13		
-	3405.82	1831.54		
-	3417.19	1713.09		
-	3364.78	1632.65		
-	3308.89	1402.24		
-	3363.1	1549.61		
-	3342.46	1359.41		
-	3496.08	1276.34		
-	3522.64	1284.06		
-	3538.39	1332.32		
-	3574.64	1319.83		
-	3559.09	1259.78		
-	3512.35	1196.06		
-	3572.11	1105.11		
-	3535.9	1027.54		
-	3492.7	930.75		
-	3469.96	818.24		
-	3478.57	713.82		
-	3459.02	650.88		
-	3426.14	570.78		
-	3327.76	507.2		
-	3289.52	524.22		
-	3272.53	464.32		
-	3314.19	456.5		
-	3296.6	429.55		
-	3306.57	445.2		
-	3247.93	431.04		
-	3233.39	466.61		
-	3233.64	512.32		
-	3192.45	552.44		
-	3183.95	593.27		
-	3211.17	645.39		
-	3309.72	780.48		
-	3308.9	766.56		
-	3300.04	824.31		
-	3258.78	791.41		
-	3159.44	804.81		
-	3106	884.09		
-	2996.48	955.85		
-	2956.56	1077.52		
-	2923.34	1125.91		
-	2888.14	1243.66		
-	2896.16	1329.11		
-	2866.72	1350.47		
-	2824.25	1338.7		
-	2786.68	1356.54		
-	2770.73	1483.59		
-	2772.53	1576.64		
-	2717.33	1570.55		
-	2736.24	1601.99		
-	2728.07	1633.43		
-	2750.73	1632.88		
-	2799.61	1605.47		
-	2830.17	1648.8		
-	2870.85	1640.22		
-	2964.53	1693.4		
-	3063.16	1685.93		
-	3083.12	1743.88		
-	3162.67	1776.45		
-	3144.44	1804.61		
-	3165.66	1808.15		
-	3135.62	1871.49		
-	3195.96	1915.27		
-	3207.34	1914.5		
-	3235.51	1991.11		
-	3244.3	2002.9		
-	3269.04	2043.17		
-	3281.62	2083.34		
-	3272.35	2145.89		
-	3184.94	2144.41		
-	3232.54	2210.16		
-	3284.28	2314.45		
-	3312.02	2383.31		
-	3307.92	2386.01		
-	3329.68	2471.03		
-	3373.96	2489.28		
-	3419.5	2508.32		
-	3512.54	2496.05		
-	3572.11	2512.01		
-	3535.9	1105.11		
-	3492.7	1027.54		
-	3469.96	930.75		
-	3478.57	818.24		
-	3459.02	713.82		
-	3426.14	650.88		
-	3327.76	570.78		
-	3289.52	507.2		
-	3272.53	524.22		
-	3314.19	464.32		
-	3296.6	456.5		
-	3306.57	429.55		
-	3247.93	445.2		
-	3233.39	431.04		
-	3233.64	466.61		
-	3192.45	512.32		
-	3183.95	552.44		
-	3211.17	593.27		
-	3309.72	645.39		
-	3308.9	780.48		
-	3300.04	766.56		
-	3258.78	824.31		
-	3159.44	791.41		
-	3106	804.81		
-	2996.48	884.09		
-	2956.56	955.85		
-	2923.34	1077.52		
-	2888.14	1125.91		
-	2896.16	1243.66		
-	2866.72	1329.11		
-	2824.25	1350.47		
-	2786.68	1338.7		
-	2770.73	1356.54		
-	2772.53	1483.59		
-	2717.33	1576.64		
-	2736.24	1570.55		
-	2728.07	1601.99		
-	2750.73	1633.43		
-	2799.61	1632.88		
-	2830.17	1605.47		
-	2870.85	1648.8		
-	2964.53	1640.22		
-	3063.16	1693.4		
-	3083.12	1685.93		
-	3162.67	1743.88		
-	3144.44	1776.45		
-	3165.66	1804.61		
-	3135.62	1808.15		
-	3195.96	1871.49		
-	3207.34	1915.27		
-	3235.51	1914.5		
-	3244.3	1991.11		
-	3269.04	2002.9		
-	3281.62	2043.17		
-	3272.35	2083.34		
-	3184.94	2145.89		
-	3232.54	2144.41		
-	3284.28	2210.16		
-	3312.02	2314.45		
-	3307.92	2383.31		
-	3329.68	2386.01		
-	3373.96	2471.03

-	3579.93	-1861.98	
-	3567.89	-1844.12	
-	3543.81	-1868.2	
-	3566.38	-1909.36	
-	3500.83	-1923.06	203
-	3364.67	-974.94	
-	3345.42	-887.06	
-	3299.77	-1134.03	
-	3337.14	-1226.14	
-	3356.8	-1234.38	
-	3368.37	-1214.53	203
-	3264.02	-1983.23	
-	3222.41	-1883.51	
-	3227.22	-1843.86	
-	2279.22	-1765.73	
-	2296.52	-1755.15	
-	2331.13	-1755.85	
-	2387.14	-1880.46	
-	2369.22	-1911.21	
-	2393.22	-1995.02	203
-	4491.51	-60.58	
-	4476.18	-64.72	
-	4475.21	-99.37	
-	4436.7	-94.41	
-	4375.59	-150.46	
-	4211.09	-126.77	
-	4184.05	38.74	
-	4140.88	122.1	
-	4081.02	197.45	
-	3969.35	274.58	
-	3820.21	219.07	
-	3689.28	89.27	
-	3667.95	42.3	
-	3651.55	-126.28	
-	3673.97	-198.07	
-	3738.77	-271.92	
-	3781.04	-373.92	
-	3767.16	-396.79	
-	3699.88	-392.94	
-	3622.14	-435.59	
-	3506.47	-371.28	
-	3458.94	-482.49	
-	3446.01	-593.29	
-	3465.75	-641.37	
-	3441.04	-700.73	
-	3441.42	-828.88	
-	3469.51	-1056.25	
-	3418.5	-791.65	
-	3471.84	-1351.55	
-	3451.06	-1745.27	
-	3449.19	-1643.67	
-	3430.8	-1600.17	
-	3419.08	-1622.37	
-	3415.57	-1538.99	
-	3405.34	-1676.4	
-	3394.23	-1596.95	
-	3353.92	-1642.58	
-	3342.56	-1634.27	
-	3372.99	-1558.32	
-	3323.84	-1511.6	
-	3272.55	-1562.72	
-	3232.59	-1573.47	
-	3263.17	-1618.38	
-	3293.93	-1604.61	
-	3331.93	-1639.69	
-	3351.35	-1736.43	
-	3321.03	-1755.51	
-	3354.48	-1767	
-	3347.44	-1797.1	
-	3320.98	-1805.13	
-	3320.32	-1859.22	
-	3280.38	-1903.78	
-	3244.8	-1895.93	
-	3273.01	-1928.85	
-	3267.09	-2000.28	
-	3302.73	-1996.23	
-	3373.33	-1908.76	
-	3346.08	-2076.55	
-	3289.53	-2223.82	
-	3250.4	-2266.88	
-	3234.67	-2321.36	
-	3214.67	-2303.14	
-	3180.25	-2307.78	
-	3205.75	-2404.22	
-	3179.82	-2373.85	
-	3098.19	-2371.89	
-	3009.23	-2328.42	
-	2943.12	-2345.21	
-	2929.91	-2273.28	
-	2878.19	-2255.49	
-	2716.75	-2337.38	
-	2702.83	-2331.07	
-	2717.29	-2319.26	
-	2693.38	-2331.79	
-	2571.78	-2488.93	
-	2682.06	-2271.67	
-	2863.66	-2194.16	
-	2885.31	-2169.16	
-	2871.04	-2146.71	
-	2931.99	-2107.08	
-	2991.66	-2127.12	
-	2977.09	-2114.81	
-	3005.12	-2099.61	
-	2983.03	-2071.94	
-	2996.37	-2037.32	
-	2954.04	-1903.47	
-	2986.4	-1896.42	
-	3004.18	-1838.05	
-	2980.58	-1831.76	
-	3068.64	-1737.92	
-	3065.4	-1692.37	
-	3110.53	-1663.85	
-	3113.79	-1615.26	
-	3102.45	-1596.83	
-	3053.32	-1625.42	
-	3056.97	-1598.07	
-	3086.47	-1577.84	
-	3089.42	-1535.99	
-	3009.11	-1626.41	
-	2978	-1593.93	
-	2974.1	-1547.73	
-	3001.11	-1502.5	
-	2989.34	-1468.48	
-	3043.74	-1319.6	
-	3010.68	-1284.06	
-	3028.57	-1238.28	
-	3018.36	-1225.03	
-	2967.53	-1232.93	
-	2924.33	-1190.61	
-	2870.27	-1079.05	
-	2719.55	-1461.82	
-	2671.81	-1508.83	
-	2664.66	-1541.04	
-	2608.04	-1551.5	
-	2588.47	-1592.87	
-	2547.35	-1594.94	
-	2644.1	-969.01	
-	2562.34	-1094.28	
-	2499.39	-1249.18	
-	2484.78	-1264.12	
-	2471.18	-1245.98	
-	2513.44	-1166.37	
-	2498.61	-1139.3	
-	2517.47	-1079.9	
-	2547.95	-1012.85	
-	2568.26	-1008.49	
-	2571.74	-928.96	
-	2626.05	-841.04	
-	2636.66	-749.58	
-	2568.32	-567.09	
-	2544.34	-558.63	
-	2574.31	-552.61	
-	2598.75	-578.76	
-	2562.19	-329.3	
-	2549.82	-352.74	
-	2561.68	-402.68	
-	2510.3	-246.63	
-	2552.83	-460.64	
-	2538.28	-475.19	
-	2501.66	-424.52	
-	2516.46	-396.37	
-	2501.09	-390.22	
-	2488.99	-409.97	
-	2462.01	-351.35	
-	2491.94	-310.68	
-	2488.76	-286.33	
-	2374.49	-170.51	
-	2361.46	-131.91	
-	2365.07	-98.45	
-	2440.64	-84.52	
-	2443.32	5.37	
-	2470.66	-48.69	
-	2427.84	134.27	
-	2416.05	140.13	
-	2415.84	114.28	
-	2359.68	179.73	
-	2352.67	250.18	
-	2294.13	240.72	
-	2275.14	145.94	
-	2233.53	78.81	
-	2187.78	117.94	
-	2214.74	137.34	
-	2192.48	214.73	
-	2223.56	222.89	
-	2284.93	319.48	
-	2260.09	381.21	
-	2210.7	372.6	
-	2226.75	411.42	
-	2193.88	529.56	
-	2257.49	566.09	
-	2192.5	626.06	
-	2214.74	741.68	
-	2196.86	874.06	
-	2211.38	905.73	
-	2199.51	1154.4	
-	2175.17	1235.14	
-	2167.29	1420.6	
-	2127.86	1539.4	
-	2159.95	1596.3	
-	2094.37	1664.51	
-	2080.23	1713.21	
-	2019.64	1729.19	
-	2010.46	1786.33	
-	1978.24	1786.31	
-	1965.79	1818.74	
-	1998.11	1835.06	
-	1955.87	1848.82	
-	1933.39	1912.26	
-	1895.15	1899.22	
-	1859.37	1914.33	
-	1837.39	1986.27	
-	1851.1	2006.75	
-	1816.22	2021.08	
-	1782.33	2000.15	
-	1724.46	2002.85	
-	1645.21	2037.42	
-	1634.02	2078.94	
-	1543.33	2148.74	
-	1507.38	2295.3	
-	1453.73	2319.69	
-	1468.95	2385.68	
-	1516.75	2415.03	
-	1497.89	2460.47	
-	1528.88	2459.87	
-	1516.68	2478.12	
-	1464.32	2485.21	
-	1458.81	2529.71	
-	1423.25	2539.15	
-	1439.32	2603.02	
-	1411.48	2642.5	
-	1422.31	2663.8	
-	1383	2678.53	
-	1392.81	2726.78	
-	1338.27	2877.19	
-	1344.05	2956.99	
-	1289.79	3002.04	
-	1336.6	3023.98	
-	1318.83	3041.23	

-	3553.81	-1868.27		
-	3587.93	-1879.06		
-	3616.75	-1876.63		
-	3639.27	-1842.75		
-	3616.63	-1824.65		
-	3597.69	-1644.77		
-	3496	-1375.18		
-	3441.5	-1969.04		
-	2559.18	-261.97	203	
-	2525.77	-265.34		
-	2543.69	-250.32		
-	2519.25	-231.18		
-	2507.16	-175.68		
-	2514.22	-54.6		
-	2540.88	-107.47		
-	2523	-125.81		
-	2543.61	-139.74		
-	2534.83	-179.13		
-	2903.28	1743.62	203	
-	2837.27	1794.44		
-	2832.79	1872.59		
-	2803.14	1892.65		
-	2854.83	1911.14		
-	2866.96	1979.68		
-	2909.69	1968.85		
-	2976.75	1812.77		
-	2955.08	1762.14		
-	1327.79	4059.99	203	
-	1317.27	3980.75		
-	1285.4	3942.13		
-	1201.19	3924.44		
-	1135.83	3938.18		
-	1141.44	4022.81		
-	1170.44	4037.38		
-	1155.12	4080.55		
-	1190.54	4087.52		
-	1220.56	4059.3		
-	1352.38	4111.69		
-	1556.32	4505.11	203	
-	1590.73	4352.98		
-	1579.9	4248.86		
-	1624.55	4296.83		
-	1648.89	4298.03		
-	1584.22	4099.2		
-	1546.57	4069.14		
-	1507.42	4095.82		
-	1530.11	4136.39		
-	1531.29	4194.93		
-	1556.77	4196.77		
-	1580.12	4244.83		
-	1524.03	4202.36		
-	1434.38	4186.54		
-	1407.45	4190.44		
-	1369.22	4250.42		
-	1403.34	4359.46		
-	1443.16	4374.93		
-	1428.19	4505.11		
-	3495.03	3017.68	203	
-	3525.4	2853.66		
-	3516.24	2750.31		
-	3493.21	2717.82		
-	3496.55	2624.36		
-	3535.33	2562.76		
-	3502.36	2549.92		
-	3381.49	2633.49		
-	3253.71	2618.62		
-	3166.31	2633.49		
-	3023.88	2577.24		
-	2965.45	2608.78		
-	2845.87	2622.29		
-	2794.46	2657.88		
-	2744.48	2651.45		
-	2693.11	2617.26		
-	2541.56	2615.14		
-	2349.84	2562.45		
-	2360.1	2468.95		
-	2370.2	2489.43		
-	2266.19	2480.1		
-	2243.08	2499.02		
-	2176.75	2476.32		
-	2141.47	2484.49		
-	2083.81	2520.55		
-	2098.8	2556.08		
-	2056.04	2556.72		
-	2015.98	2584.71		
-	1986.78	2557.85		
-	1941.4	2553.32		
-	1947.79	2511.76		
-	1934.16	2507.23		
-	1888.35	2536.39		
-	1906.33	2579.76		
-	1864.13	2626.46		
-	1781.33	2657.52		
-	1763.31	2606.43		
-	1736.06	2612.3		
-	1699.74	2667.14		
-	1699.61	2706.07		
-	1629.38	2761.91		
-	1609.79	2825.64		
-	1583.65	2829		
-	1559.41	2950.31		
-	1587.41	2995.32		
-	1586.67	3071.68		
-	1608.1	3081.73		
-	1635.55	3040.36		
-	1680.17	3037.05		
-	1663.18	3121.4		
-	1717.67	3186.02		
-	1696.4	3242.38		
-	1748.21	3391.73		
-	1799.97	3469.49		
-	1784.79	3510.6		
-	1821.31	3617.6		
-	1801.13	3754.15		
-	1748.75	3902.03		
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-	1790.81	3973.35		
-	1836.25	4096.03		
-	1912.41	4217.97		
-	1969.22	4250.42		
-	2001.28	4310.04		
-	2053.13	4306.78		
-	2160.79	4257.4		
-	2318.63	4057.69		
-	2354.86	4108.87		
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-	2660.18	4136.77		
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-	2762.26	4238.18		
-	2771.93	4378.1		
-	2742.1	4459.11		
-	2760.74	4441.6		
-	2761.95	4462.42		
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-	2684.02	4483.98		
-	2653.49	4514.25		
-	2451.45	2052.41	203	
-	2442.94	2036.45		
-	2417.36	2062.22		
-	2423.62	2088.02		
-	2372.14	2107.16		
-	2284.82	2199.58		
-	2242.75	2317.08		
-	2275.72	2326.46		
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-	2427.16	2176.15		
-	2425.11	2088.58		
-	2580.63	4514.25	203	
-	2747.84	4392.35		
-	2709.42	4275.23		
-	2679.14	4248.17		
-	2647.36	4248.41		
-	2588.68	4292.89		
-	2589.53	4381.85		
-	2492.3	4329.17		
-	2370.12	4406.22		
-	2358.85	4395.28		
-	2294.2	4419.68		
-	2269.66	4446.9		
-	2278.66	4470.49		
-	2200.76	4456.59		
-	2177.98	4492.05		
-	2208.48	4511.21		
-	2827.3	2103.93	203	
-	2863.87	2084.96		
-	2864.59	2060		
-	2822.41	2056.94		
-	2657.61	2130.21		
-	2565.15	2078.93		
-	2531.04	2115.12		
-	2573.05	2150.08		
-	2695.05	2152.98		
-	2721.92	2184.5		
-	3141.35	1981.36	203	
-	3104.04	1997.14		
-	3090.09	1947.06		
-	3024.56	1895.93		
-	2965.5	1901.72		
-	2939.98	1933.54		
-	2939.91	1992.71		
-	2990.41	2089.45		
-	3108.71	2044.54		
-	2208.77	4511.21	203	
-	2232.86	4511.21		
-	2571.49	4514.25	203	
-	2580.34	4514.25		
-	2659.88	4514.25	203	
-	2725.63	4490.95		
-	2702.26	4514.25		
-	596.38	4502.06	223	
-	617.52	4442.44		
-	641.8	4471.35		
-	661.6	4444.23		
-	635.93	4394.68		
-	629.84	4283.15		
-	651.11	4237.74		
-	620.68	4153.9		
-	625.35	4038.65		
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-	565.43	3886.32		
-	492.52	3788.79		
-	475.08	3791.88		
-	478.23	3760.17		
-	428.8	3681.32		
-	440.47	3526.66		
-	355.52	3492.47		
-	367.43	3470.52		
-	475.86	3474.62		
-	489.57	3458.7		
-	480.42	3414.78		
-	467.27	3398.6		
-	428.02	3413.42		
-	382.84	3386.73		
-	324.57	3398.72		
-	285.83	3458.87		
-	237.18	3471.69		
-	254.88	3442.22		
-	228.13	3412.92		
-	248.78	3393.44		
-	236.33	3371.39		
-	209.56	3370.25		
-	262.2	3348.62		
-	303.86	3361.88		
-	342.87	3350		
-	399.65	3270.97		
-	461.74	3255.52		
-	526.11	3188.09		
-	512.15	3093.91		
-	529.97	3133.6		
-	535.29	3106.93		
-	499.12	3005.99		
-	513.63	2963.05		
-	469.17	2934.1		
-	477.32	2907.97		
-	445.87	2890.9		
-	443.61	2842.4		
-	334.18	2820.11		

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-	3493.73	-3833.74	2774.35
-	3437.4	-3879.45	2792.15
-	3418.54	-3858.85	2751.7
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-	3375.96	-3870.88	2664.11
-	3341.42	-3885.58	2635.68
-	3306.69	-3785.37	2595.62
-	3286.72	-3824.81	2535.18
-	3250.24	-3804.29	2382.9
-	3211.59	-3864.67	2360.56
-	3236.38	-3919.2	2302.6
-	3234.65	-3970.32	2345.08
-	3160.54	-3905.18	2377.38
-	3108.02	-3889.27	2365.55
-	3081.5	-3950.9	2380.74
-	3037.61	-3927.64	2240.27
-	2943.14	-3836.42	2009.6
-	2873.8	-3670.64	1824.84
-	2915.79	-3530.39	1709.91
-	2870.47	-3306.43	1601.97
-	2927.97	-3208.54	1418.75
-	2927.98	-3161.57	1399.32
-	2901.02	-3137.33	1361.05
-	2857.57	-2953.34	1332.33
-	2819.16	-2887.14	1121.28
-	2778.55	-2888.01	1223.35
-	2662.79	-2743.35	1279.78
-	2635.53	-2735.43	1304.46
-	2633.23	-2707.31	1326.28
-	2596.93	-2753.31	1332.33
-	2583.46	-2718.57	1361.05
-	2576.44	-2809.95	1418.75
-	2583.46	-2718.57	1399.32
-	2596.93	-2753.31	1121.28
-	2633.23	-2707.31	1223.35
-	2635.53	-2735.43	1279.78
-	2662.79	-2743.35	1304.46
-	2778.55	-2888.01	1326.28
-	2819.16	-2887.14	1332.33
-	2857.57	-2953.34	1361.05
-	2901.02	-3137.33	1418.75
-	2927.98	-3161.57	1601.97
-	2927.97	-3208.54	1709.91
-	2870.47	-3306.43	1824.84
-	2915.79	-3530.39	2009.6
-	2873.8	-3670.64	2140.27
-	2943.14	-3836.42	2380.74
-	3037.61	-3927.64	2365.55
-	3081.5	-3950.9	2377.38
-	3108.02	-3889.27	2345.08
-	3160.54	-3905.18	2117.23
-	3234.65	-3970.32	2136.77
-	3236.38	-3919.2	2116.28
-	3211.59	-3864.67	2006.67
-	3250.24	-3804.29	1987.5
-	3286.72	-3824.81	1909.56
-	3306.69	-3785.37	1918.48
-	3341.42	-3885.58	1888.91
-	3375.96	-3870.88	1681.37
-	3397.77	-3897.74	1564.78
-	3418.54	-3858.85	1510.19
-	3437.4	-3879.45	1447.98
-	3493.73	-3833.74	1323.1
-	2120.26	-4189.3	2111.89
-	2176.18	-4158.2	1411.75
-	2249.41	-4135.62	1141.75
-	2183.91	-4053.38	785.66
-	2157.48	-3971.39	565.48
-	2122.1	-3927.35	391.24
-	2117.86	-3847.68	360.69
-	2074.35	-3732.71	188.31
-	2088.24	-3584.34	167.94
-	2109.23	-3663.45	223.18
-	2150.62	-3508.08	207.88
-	2149.56	-3555.79	184.91
-	2218.3	-3496.42	102.93
-	2249.96	-3335.69	104.87
-	2390.31	-3185.28	88.44
-	2429.99	-3162.6	-56.56
-	2434.32	-3130.34	-79.35
-	2478.76	-3089.46	-209.61
-	2470.59	-3024.32	-219.28
-	2531.36	-2931.2	-209.61
-	2506.35	-2821.1	-79.35
-	2576.44	-2809.95	-56.56
-	2583.46	-2718.57	88.44
-	2596.93	-2753.31	102.93
-	2633.23	-2707.31	104.87
-	2635.53	-2735.43	167.94
-	2662.79	-2743.35	188.31
-	2778.55	-2888.01	207.88
-	2819.16	-2887.14	184.91
-	2857.57	-2953.34	102.93
-	2901.02	-3137.33	104.87
-	2927.98	-3161.57	88.44
-	2927.97	-3208.54	-56.56
-	2870.47	-3306.43	-79.35
-	2915.79	-3530.39	-209.61
-	2873.8	-3670.64	-219.28
-	2943.14	-3836.42	-209.61
-	3037.61	-3927.64	-79.35
-	3081.5	-3950.9	-56.56
-	3108.02	-3889.27	88.44
-	3160.54	-3905.18	102.93
-	3234.65	-3970.32	104.87
-	3236.38	-3919.2	167.94
-	3211.59	-3864.67	188.31
-	3250.24	-3804.29	207.88
-	3286.72	-3824.81	184.91
-	3306.69	-3785.37	102.93
-	3341.42	-3885.58	104.87
-	3375.96	-3870.88	88.44
-	3397.77	-3897.74	-56.56
-	3418.54	-3858.85	-79.35
-	3437.4	-3879.45	-209.61
-	3493.73	-3833.74	-219.28
-	2120.26	-4189.3	-209.61
-	2176.18	-4158.2	-79.35
-	2249.41	-4135.62	-56.56
-	2183.91	-4053.38	88.44
-	2157.48	-3971.39	102.93
-	2122.1	-3927.35	104.87
-	2117.86	-3847.68	167.94
-	2074.35	-3732.71	188.31
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-	2150.62	-3508.08	102.93
-	2149.56	-3555.79	104.87
-	2218.3	-3496.42	88.44
-	2249.96	-3335.69	-56.56
-	2390.31	-3185.28	-79.35
-	2429.99	-3162.6	-209.61
-	2434.32	-3130.34	-219.28
-	2478.76	-3089.46	-209.61
-	2470.59	-3024.32	-79.35
-	2531.36	-2931.2	-56.56
-	2506.35	-2821.1	88.44
-	2576.44	-2809.95	102.93
-	2583.46	-2718.57	104.87
-	2596.93	-2753.31	167.94
-	2633.23	-2707.31	188.31
-	2635.53	-2735.43	207.88
-	2662.79	-2743.35	184.91
-	2778.55	-2888.01	102.93
-	2819.16	-2887.14	104.87
-	2857.57	-2953.34	167.94
-	2901.02	-3137.33	188.31
-	2927.98	-3161.57	207.88
-	2927.97	-3208.54	184.91
-	2870.47	-3306.43	102.93
-	2915.79	-3530.39	104.87
-	2873.8	-3670.64	88.44
-	2943.14	-3836.42	-56.56
-	3037.61	-3927.64	-79.35
-	3081.5	-3950.9	-209.61
-	3108.02	-3889.27	-219.28
-	3160.54	-3905.18	-209.61
-	3234.65	-3970.32	-79.35
-	3236.38	-3919.2	-56.56
-	3211.59	-3864.67	88.44
-	3250.24	-3804.29	102.93
-	3286.72	-3824.81	104.87
-	3306.69	-3785.37	167.94
-	3341.42	-3885.58	188.31
-	3375.96	-3870.88	207.88
-	3397.77	-3897.74	184.91
-	3418.54	-3858.85	102.93
-	3437.4	-3879.45	104.87
-	3493.73	-3833.74	167.94

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-	1956.17	3734.06		
-	1893.53	3858.93		
-	1851.84	3887.31		
-	1864.95	3904.82		
-	1893.52	3899.65		
-	1897.56	3976.95		
-	1936.81	4004.72		
-	1955.8	4169.6		
-	2098.82	4130.03		
-	2201.63	4024.53		
-	2245.06	3922.96		
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-	2317.44	3707.55		
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-	2366.21	3829.66		
-	2409.58	3877.91		
-	2377.81	3928.96		
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-	2752.2	3941.36		
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-	-1363.47	-899.39		
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-	-1276.7	-803.77		
-	-1184.25	-707.58		
-	-1160.79	-562.85		
-	-1191.63	-447.47		
-	-1255.2	-395.33		
-	-1259.54	-363.07		
-	-1183.66	-231.26		
-	-1465.58	-23.26		
-	-1499.36	-14.84		
-	-1492.67	-46.98		
-	-1509.25	-69.24		
-	-1943.92	-207.8.9	603	
-	-1899.47	-1966.51		
-	-1913.26	-1898.77		
-	-1847.73	-1773.15		
-	-1813.69	-1755.04		
-	-1735.02	-1788.88		
-	-1713.48	-1823.17		
-	-1674.26	-1826.66		
-	-1612.9	-1727.79		
-	-1580.64	-1711.38		
-	-1561.54	-1600.95		
-	-1587.04	-1506.5		
-	-1741.7	-1470.9		
-	-1857.59	-1492.39		
-	-2034.09	-1470.38		
-	-2084.13	-1482.18		
-	-2133.71	-1530.04		
-	-2160.03	-1627.79		
-	-2244.41	-1769.96		
-	-2217.81	-1872.58		
-	-2139.87	-1949.56		
-	-2141.62	-2023.57		
-	-2114.04	-2076.31		
-	-1964.47	-2145.93		
-	-1299.76	-1743.62	603	
-	-1265.4	-1774.32		
-	-1214.43	-1778.96		
-	-1178.1	-1711.95		
-	-1121.62	-1718.81		
-	-1068.12	-1640.01		
-	-1064.57	-1564.46		
-	-1123.19	-1554.96		
-	-1146.33	-1511		
-	-1191.2	-1485.53		
-	-1357.61	-1548.68		
-	-1382.01	-1582.04		
-	-1390.92	-1662.15		
-	-1344.7	-1721.56		
-	-1506.2	-538.52	623	
-	-1254.72	-738.97		
-	-1123.47	-754.67		
-	-1045.96	-786.32		
-	-1905.08	-929.38		
-	-1132.1	-1370.8		
-	-1189.99	-1387.6		
-	-1327.13	-1304.35		
-	-1091.6	-1363.85		
-	-1009.44	-1383.58		
-	-1184.41	-1420.5		
-	-1106.84	-1529.94		
-	-1757.86	-906.68	623	
-	-1799.09	-908.08		
-	-1875.14	-867.21		
-	-1915	-878.34		
-	-1970.88	-807.81		
-	-1921.3	-799.18		
-	-1815.47	-840.51		
-	-1768.58	-871.61		
-	-1533.19	-1475.39	623	
-	-1548.02	-1402.62		
-	-1658.84	-1345.74		
-	-1782.66	-1337.24		
-	-1936.77	-1374.66		
-	-1999.2	-1362.52		
-	-1429.17	-1429.1		
-	-1341.81	-1362.84		
-	-1296.27	-1296.27		
-	-1515.35	-830.03	623	
-	-1393.67	-821.51		
-	-1287.29	-726.64		
-	-1259.41	-643.07		
-	-1425.98	-478		
-	-1509.25	-177.65		
-	-1976.36	-1934.06	623	
-	-1830.63	-1698.73		
-	-1688.31	-1736		
-	-1615.3	-1685.66		
-	-1589.87	-1609.13		
-	-1609.55	-1544.44		
-	-1644.2	-1528.87		
-	-1905.48	-1575.77		
-	-1955.72	-1523.76		
-	-2028.47	-1511.13		
-	-2102.21	-1552.06		
-	-2115.34	-1643.03		
-	-2199.99	-1751.14		
-	-2199.26	-1857		
-	-2164.62	-1905.6		
-	-2083.39	-1943.76		
-	-2105.35	-1965.79		
-	-2095.22	-2005.74		
-	-2034.19	-2065.03		
-	-1970.17	-2059.05		
-	-1938.42	-2024.16		
-	-1950.94	-1951.19		
-	-1182.43	-1743.62	623	
-	-1145.1	-1615.31		
-	-1163.23	-1564.47		
-	-1223.58	-1550.16		
-	-1338.99	-1593.99		
-	-1352.02	-1628.81		
-	-1340.06	-1657.73		
-	-1227.2	-1747.15		
-	-506.2	-617.77	643	
-	-4415.09	-670.14		
-	-4289.89	-792.87		
-	-4207.75	-808.48		
-	-4162.7	-783.16		
-	-4102.54	-799.63		
-	-3963.56	-918.46		
-	-3932.3	-997.88		
-	-3894.39	-1155.33		
-	-3911.48	-1203.09		
-	-4015.58	-1309.21		

683

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0A°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***
Lw — Sound Power Level (dB)
Ad — Distance attenuation axa geometrical divergence" ISO9613-2 (dB)"
Ab — Barrier attenuation ISO9613-2 (dB)
Ag — Ground effect ISO9613-2 (dB)
Aa — Air absorption ISO9613-1 (dB)

-	-4069.4	-1319.72		
-	-4115.67	-1297.33		
-	-4143.48	-1350.12		
-	-4251.18	-1419.21		
-	-4241.78	-1461.77		
-	-4259.89	-1487.11		
-	-4207.43	-1529.94		
-	-4454.17	1469.3	643	
-	-4478.97	1442.08		
-	-4518.4	1435.55		
-	-4515.35	744.69	643	
-	-4479.13	724.69		
-	-4396.48	733.99		
-	-4361.9	675.51		
-	-4395.89	628.29		
-	-4410.59	475.92		
-	-4512.3	295.59		
-	-3568.13	1475.39	643	
-	-3560.17	1448.14		
-	-3579.15	1410.96		
-	-3671.03	1373.23		
-	-3729.2	1403.45		
-	-3763.31	1472.34		
-	-2157.77	1743.62	643	
-	-2180.6	1806.73		
-	-2156.72	1872.24		
-	-2084.63	1925.09		
-	-2035.69	1927.83		
-	-1948.92	1847.25		
-	-1896.46	1736.34		
-	-1891.05	1664.09		
-	-1952.83	1600.2		
-	-2046.47	1570.01		
-	-2092.06	1678.8		
-	-4506.2	-666.89	663	
-	-4451.56	-688.31		
-	-4285.68	-853.76		
-	-4167.56	-822.83		
-	-4016.85	-894.69		
-	-3936.29	-1127.59		
-	-3944.79	-1191.04		
-	-3982.64	-1240.78		
-	-4070.12	-1260.72		
-	-4150.17	-1241.03		
-	-4211.13	-1338.57		
-	-4350.65	-1444.72		
-	-4347.63	-1529.94		
-	-4512.3	694.37	663	
-	-4468.05	655.46		
-	-4481.21	531		
-	-4512.3	469.33		
-	-3607.75	1475.39	663	
-	-3611.71	1437.49		
-	-3684.12	1417.46		
-	-3716.98	1436.85		
-	-3721.14	1472.34		
-	-2119.05	1743.62	663	
-	-2152.16	1780.39		
-	-2155.88	1834.64		
-	-2043.27	1912.55		
-	-1981.16	1851.91		
-	-1925.64	1714.41		
-	-1958.74	1673.12		
-	-2020.98	1666.61		
-	-4506.2	-716.96	683	
-	-4465.65	-713.97		
-	-4403.16	-813.01		
-	-4295.15	-889.83		
-	-4185.87	-864.62		
-	-4067.3	-896.01		
-	-4028.41	-957.2		
-	-3974.36	-1139.77		
-	-4006.41	-1195.98		
-	-4176.67	-1196.54		
-	-4226.42	-1274.51		
-	-4360.15	-1380.31		
-	-4439.99	-1529.94		
-	-4506.2	-750.57	703	
-	-4470.68	-767.59		
-	-4401.45	-859.65		
-	-4288.32	-923.27		
-	-4195.13	-894.86		
-	-4097.78	-926.5		
-	-4014.85	-1111.99		
-	-4030.71	-1130.63		
-	-4203.77	-1145.41		
-	-4247.12	-1231.25		
-	-4399.47	-1362.36		
-	-4435.72	-1468.29		
-	-4502.11	-1529.23		
-	-4503.16	-791.51	723	
-	-4427.34	-888.76		
-	-4287.91	-947.28		
-	-4195.26	-921.98		
-	-4137.56	-931.57		
-	-4108.73	-962.93		
-	-4077.74	-1059.1		
-	-4088.41	-1081.79		
-	-4219.61	-1078.92		
-	-4288.47	-1220.47		
-	-4372.95	-1277.46		
-	-4503.11	-1438.72		
-	-4503.16	-873.36	743	
-	-4398.31	-954.43		
-	-4329.42	-965.65		
-	-4272.98	-1033.14		
-	-4311.19	-1182.42		
-	-4500.11	-1346.35		
-	-4503.16	-924.23	763	
-	-4342.94	-1045.18		
-	-4329.39	-1088.89		
-	-4358.82	-1180.58		
-	-4500.11	-1296.15		
-	-4503.16	-980.48	783	
-	-4395.56	-1049.23		
-	-4378.15	-1102.63		
-	-4399.26	-1161.42		
-	-4503.16	-1245.77		
-	-4503.16	-1032.33	803	
-	-4445.51	-1065.1		
-	-4434.52	-1103.24		
-	-4445.71	-1140.49		
-	-4503.16	-1197		

Noise Mapping Results M 109 with Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
M-5	1.5	100.39	83.36	92.65	87.57	77.14	94.53	95.69	91.67	83.74	65.77	20.97	
M-1	1.5	67.45	59.06	65.9	56.29	44.13	54.49	50.67	40.6	11.88	-92.02	-462.58	
M-3	1.5	73.34	62.12	71.18	63.68	52.04	64.72	61.2	47.96	9.35	-126.21	-607.39	
M-2	1.5	71.22	60.1	69.25	61.29	49.11	62.29	58.24	43.33	-3.65	-174.49	-789.01	
M-4	1.5	79.49	66.08	75.38	67.79	56.8	73.19	72.97	65.11	40.57	-47.17	-357.66	

*** Receiver Results - Sources Analysis ***

Receiver Name	Point
M-5 [1.5m]	100.39
M-1 [1.5m]	67.45
M-3 [1.5m]	73.34
M-2 [1.5m]	71.22
M-4 [1.5m]	79.49

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-5	Point	169.84	419.14	422.48	31.5	179.1	-55.6	0	4.14	-4.88	-4.88	-	-	0	-39.4	83.36
M-5	Point	169.84	419.14	422.48	63	175.3	-55.6	-0.02	4.14	-4.98	-4.98	-	-	0	-26.2	92.65
M-5	Point	169.84	419.14	422.48	125	164.5	-55.6	-0.06	-0.38	-4.79	-4.79	-	-	0	-16.1	87.57
M-5	Point	169.84	419.14	422.48	250	149.1	-55.6	-0.19	-7.57	0	2.03	-	-	0	-8.6	77.14
M-5	Point	169.84	419.14	422.48	500	160	-55.6	-0.48	-3.63	-2.57	-2.57	-	-	0	-3.2	94.53
M-5	Point	169.84	419.14	422.48	1000	158.7	-55.6	-0.85	0.7	-7.27	-7.27	-	-	0	0	95.69
M-5	Point	169.84	419.14	422.48	2000	155.2	-55.6	-1.53	1.24	-8.84	-8.84	-	-	0	1.2	91.67
M-5	Point	169.84	419.14	422.48	4000	151.9	-55.6	-3.89	1.24	-10.91	-10.91	-	-	0	1	83.74
M-5	Point	169.84	419.14	422.48	8000	147.6	-55.6	-13.01	1.24	-13.35	-13.35	-	-	0	-1.1	65.77
M-5	Point	169.84	419.14	422.48	16000	144.9	-55.6	-46.92	1.24	-16.05	-16.05	-	-	0	-6.6	20.97
M-1	Point	1815.25	224.5	422.48	31.5	179.1	-76.18	-0.04	5.83	-10.25	-10.25	-	-	0	-39.4	59.06
M-1	Point	1815.25	224.5	422.48	63	175.3	-76.18	-0.16	5.83	-12.68	-12.68	-	-	0	-26.2	65.9
M-1	Point	1815.25	224.5	422.48	125	164.5	-76.18	-0.62	-5.49	-9.83	-9.83	-	-	0	-16.1	56.29
M-1	Point	1815.25	224.5	422.48	250	149.1	-76.18	-2.06	-7.37	-10.77	-10.77	-	-	0	-8.6	44.13
M-1	Point	1815.25	224.5	422.48	500	160	-76.18	-5.08	-3.29	-17.76	-17.76	-	-	0	-3.2	54.49
M-1	Point	1815.25	224.5	422.48	1000	158.7	-76.18	-9.04	1.19	-24.01	-24.01	-	-	0	0	50.67
M-1	Point	1815.25	224.5	422.48	2000	155.2	-76.18	-16.37	1.75	-25	-25	-	-	0	1.2	40.6
M-1	Point	1815.25	224.5	422.48	4000	151.9	-76.18	-41.59	1.75	-25	-25	-	-	0	1	11.88
M-1	Point	1815.25	224.5	422.48	8000	147.6	-76.18	-139.09	1.75	-25	-25	-	-	0	-1.1	-92.02
M-1	Point	1815.25	224.5	422.48	16000	144.9	-76.18	-501.45	1.75	-25	-25	-	-	0	-6.6	-462.58
M-3	Point	2355.21	204.5	422.48	31.5	179.1	-78.44	-0.05	5.87	-4.96	-4.96	-	-	0	-39.4	62.12
M-3	Point	2355.21	204.5	422.48	63	175.3	-78.44	-0.21	5.87	-5.13	-5.13	-	-	0	-26.2	71.18
M-3	Point	2355.21	204.5	422.48	125	164.5	-78.44	-0.8	-5.48	0	0.02	-	-	0	-16.1	63.68
M-3	Point	2355.21	204.5	422.48	250	149.1	-78.44	-2.67	-7.36	0	1.3	-	-	0	-8.6	52.04
M-3	Point	2355.21	204.5	422.48	500	160	-78.44	-6.59	-3.28	-3.77	-3.77	-	-	0	-3.2	64.72
M-3	Point	2355.21	204.5	422.48	1000	158.7	-78.44	-11.72	1.2	-8.54	-8.54	-	-	0	0	61.2
M-3	Point	2355.21	204.5	422.48	2000	155.2	-78.44	-21.24	1.76	-10.52	-10.52	-	-	0	1.2	47.96
M-3	Point	2355.21	204.5	422.48	4000	151.9	-78.44	-53.96	1.76	-12.91	-12.91	-	-	0	1	9.35
M-3	Point	2355.21	204.5	422.48	8000	147.6	-78.44	-180.46	1.76	-15.58	-15.58	-	-	0	-1.1	-126.21
M-3	Point	2355.21	204.5	422.48	16000	144.9	-78.44	-650.6	1.76	-18.4	-18.4	-	-	0	-6.6	-607.39
M-2	Point	3025.51	223.45	422.48	31.5	179.1	-80.62	-0.07	5.9	-4.81	-4.81	-	-	0	-39.4	60.1
M-2	Point	3025.51	223.45	422.48	63	175.3	-80.62	-0.27	5.9	-4.86	-4.86	-	-	0	-26.2	69.25
M-2	Point	3025.51	223.45	422.48	125	164.5	-80.62	-1.03	-5.47	0	0.53	-	-	0	-16.1	61.29
M-2	Point	3025.51	223.45	422.48	250	149.1	-80.62	-3.43	-7.35	0	2.24	-	-	0	-8.6	49.11
M-2	Point	3025.51	223.45	422.48	500	160	-80.62	-8.47	-3.27	-2.16	-2.16	-	-	0	-3.2	62.29
M-2	Point	3025.51	223.45	422.48	1000	158.7	-80.62	-15.06	1.21	-5.99	-5.99	-	-	0	0	58.24
M-2	Point	3025.51	223.45	422.48	2000	155.2	-80.62	-27.28	1.77	-6.94	-6.94	-	-	0	1.2	43.33
M-2	Point	3025.51	223.45	422.48	4000	151.9	-80.62	-69.32	1.77	-8.38	-8.38	-	-	0	1	-3.65
M-2	Point	3025.51	223.45	422.48	8000	147.6	-80.62	-231.82	1.77	-10.33	-10.33	-	-	0	-1.1	-174.49
M-2	Point	3025.51	223.45	422.48	16000	144.9	-80.62	-835.77	1.77	-12.69	-12.69	-	-	0	-6.6	-789.01
M-4	Point	1496.32	461.64	422.48	31.5	179.1	-74.6	-0.03	5.79	-4.77	-4.77	-	-	0	-39.4	66.08
M-4	Point	1496.32	461.64	422.48	63	175.3	-74.6	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	75.38
M-4	Point	1496.32	461.64	422.48	125	164.5	-74.6	-0.51	-5.49	0	0.72	-	-	0	-16.1	67.79
M-4	Point	1496.32	461.64	422.48	250	149.1	-74.6	-1.71	-7.38	0	2.61	-	-	0	-8.6	56.8
M-4	Point	1496.32	461.64	422.48	500	160	-74.6	-4.24	-3.3	-1.47	-1.47	-	-	0	-3.2	73.19
M-4	Point	1496.32	461.64	422.48	1000	158.7	-74.6	-7.54	1.18	-4.77	-4.77	-	-	0	0	72.97
M-4	Point	1496.32	461.64	422.48	2000	155.2	-74.6	-13.65	1.74	-4.77	-4.77	-	-	0	1.2	65.11
M-4	Point	1496.32	461.64	422.48	4000	151.9	-74.6	-34.7	1.74	-4.77	-4.77	-	-	0	1	40.57
M-4	Point	1496.32	461.64	422.48	8000	147.6	-74.6	-116.03	1.74	-4.77	-4.77	-	-	0	-1.1	-47.17
M-4	Point	1496.32	461.64	422.48	16000	144.9	-74.6	-418.32	1.74	-4.77	-4.77	-	-	0	-6.6	-357.66

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5

Point Sources	x	y	Height	Lw	Hz
Point	223773.84	-610840.15	2	179.1	31.5
-	-	-	-	175.3	63
-	-	-	-	164.5	125
-	-	-	-	149.1	250
-	-	-	-	160	500
-	-	-	-	158.7	1000
-	-	-	-	155.2	2000
-	-	-	-	151.9	4000
-	-	-	-	147.6	8000
-	-	-	-	144.9	16000

Ground Height Points	x	y	Height
-	224184.6	-610862.89	476
-	222718.9	-610748.33	453

Ground Height Lines	x	y	Height
-	228142.27	-608184.3	163
-	228096.44	-607996.43	
-	228056.79	-608030.11	
-	227867.84	-607998.96	
-	227783.14	-607962.9	
-	227764.98	-607900.76	
-	227725.83	-607855.82	
-	227677.51	-607934.28	
-	227572.23	-607992.12	
-	227490.28	-607963.37	
-	227517.44	-608042.55	
-	227477.91	-608065.46	
-	227447.82	-608137.86	
-	227408	-608177.63	
-	227415.31	-608225.32	
-	227457.18	-608263.06	
-	227430.8	-608338.26	
-	227439.32	-608450.77	
-	227409.06	-608466.02	
-	227353.72	-608437.72	
-	227305.09	-608437.79	
-	227201.5	-608493.14	
-	227106.6	-608576.84	
-	227082.01	-608643.83	
-	227030.78	-608706.72	
-	227038.67	-608726.57	
-	227021.11	-608726.27	
-	227054.22	-608829.54	
-	227015.64	-608961.29	
-	227032.62	-609000.13	
-	227057.38	-608891.54	
-	227130.55	-608863.14	
-	227152.94	-608822.53	
-	227185.04	-608807.35	
-	227212.25	-608705.02	
-	227319.14	-608661.01	
-	227337.98	-608544.23	
-	227430.26	-608523.48	
-	227522.52	-608458.37	
-	227606.82	-608498.99	
-	227636.3	-608539.75	
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-	227790.68	-608484.91	
-	227767.27	-608445.41	
-	227773.37	-608410.63	
-	227868.15	-608303.31	
-	227949.96	-608324.38	
-	228023.19	-608388.42	
-	228029.94	-608494.48	
-	227931.78	-608569.37	
-	227844.56	-608535.21	
-	227817.03	-608543.98	
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-	227761.48	-608809.68	
-	227794.51	-608813.37	
-	227804.09	-608885.23	
-	227843.99	-608932.05	
-	227831.88	-608965.5	
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-	228151.41	-609532.15	
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-	226935.04	-608824.1	

685

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-	225182.68	-608348.88		
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-	226402.24	-609256.45		
-	226394.07	-609225.01		
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-	226496.17	-609221.54		
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-	226749.12	-609141.07		
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-	226873.34	-608911.73		
-	226901.51	-608912.5		
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-	225941.14	-61I68I.06	-
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-	226157.94	-61II37.68	-
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-	226182.46	-61I23I.37	-
-	226167.66	-61I25I.52	-
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-	226176.3	-61I07I.63	-
-	226227.67	-61I229.68	-
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-	226302.66	-61I57I.58	-
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-	227131.75	-6II46I.37	-
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-	227124.94	-6II3O9.49	-
-	227172.47	-6II19I.28	-
-	227288.14	-6II26I.59	-
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687

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-	219981.88	-609409.55	
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-	219944.86	-609354.66	
-	221546.95	-609083.38	663
-	221513.84	-609046.61	
-	221510.12	-608992.36	
-	221622.73	-608914.45	
-	221684.84	-608975.09	
-	221740.36	-609112.59	
-	221707.26	-609153.88	
-	221645.02	-609160.4	
-	219159.79	-611543.96	683
-	219200.35	-611540.97	
-	219262.84	-611640.01	
-	219370.85	-611716.83	
-	219480.13	-611691.62	
-	219598.7	-611723.01	
-	219637.59	-611784.2	
-	219691.64	-611966.77	
-	219659.58	-612022.98	
-	219489.33	-612023.54	
-	219439.58	-612101.51	
-	219305.85	-612207.31	
-	219226.01	-612356.94	
-	219159.79	-611577.57	703
-	219195.32	-611594.59	
-	219264.55	-611686.65	
-	219377.68	-611750.27	
-	219470.87	-611721.86	
-	219568.22	-611753.51	
-	219651.15	-611938.99	
-	219635.29	-611957.63	
-	219462.23	-611972.41	
-	219418.88	-612058.25	
-	219266.53	-612189.36	
-	219230.28	-612295.29	
-	219165.89	-612356.24	
-	219162.84	-611618.51	723
-	219238.66	-611715.76	
-	219378.09	-611774.28	
-	219470.74	-611748.98	
-	219528.44	-611758.58	
-	219557.27	-611789.93	
-	219588.26	-611886.1	
-	219577.59	-611908.8	
-	219446.39	-611905.92	
-	219377.53	-612047.47	
-	219293.05	-612104.46	
-	219165.89	-612265.72	
-	219162.84	-611700.36	743
-	219267.69	-611781.43	
-	219336.58	-611792.65	
-	219393.02	-611860.14	
-	219354.81	-612009.42	
-	219165.89	-612173.36	
-	219162.84	-611751.23	763
-	219323.06	-611872.18	
-	219336.61	-611915.89	
-	219307.18	-612007.58	
-	219165.89	-612123.15	
-	219162.84	-611807.48	783
-	219270.44	-611876.23	
-	219287.85	-611929.63	
-	219266.74	-611988.42	
-	219162.84	-612072.77	
-	219162.84	-611859.33	803
-	219220.49	-611892.1	
-	219231.48	-611930.24	
-	219220.29	-611967.49	
-	219162.84	-612024	
-	223733.07	-610796.57	420
-	223735.15	-610837.38	
-	223715.21	-610861.92	
-	223742.95	-610882.22	
-	223771.02	-610873.83	
-	223798.61	-610864.32	
-	223804.87	-610858.06	
-	223809.74	-610841.82	
-	223812.29	-610827.68	
-	223812.76	-610811.91	
-	223810.9	-610800.55	
-	223808.58	-610789.65	
-	223805.11	-610767.62	
-	223805.34	-610767.62	
-	223734.09	-610868.46	420
-	223763.47	-610853.96	
-	223792.34	-610843.21	
-	223796.22	-610833.83	
-	223799.34	-610840.15	424
-	223793.15	-610857.71	
-	223744.84	-610874.83	

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Â°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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Noise Mapping Results / No Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
M-1	1.5	75.44	64.22	73.15	65.55	54.79	66.99	64.12	52.61	21	-86.65	-463.6
M-2	1.5	71	60.01	69.12	61.24	49.06	61.66	57.2	41.75	-5.92	-177.9	-795.41
M-3	1.5	73.5	62.23	71.3	63.8	52.17	64.98	61.55	48.45	10.25	-123.75	-599.18
M-4	1.5	79.49	66.08	75.38	67.79	56.8	73.18	72.96	65.1	40.56	-47.19	-357.75
M-5	1.5	107.17	88.55	97.93	92.78	77.57	97.51	103.37	100.95	95.19	80.07	39.47

*** Receiver Results - Sources Analysis ***

Receiver Name	Source
M-1 [1.5m]	75.44
M-2 [1.5m]	71
M-3 [1.5m]	73.5
M-4 [1.5m]	79.49
M-5 [1.5m]	107.17

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-1	Source	1815.25	224.5	421.21	31.5	179.1	-76.26	-0.04	5.83	-5	-5	-	-	0	-39.4	64.22
M-1	Source	1815.25	224.5	421.21	63	175.3	-76.26	-0.16	5.83	-5.35	-5.35	-	-	0	-26.2	73.15
M-1	Source	1815.25	224.5	421.21	125	164.5	-76.26	-0.62	-5.49	-0.47	-0.47	-	-	0	-16.1	65.55
M-1	Source	1815.25	224.5	421.21	250	149.1	-76.26	-2.08	-7.37	0	0.41	-	-	0	-8.6	54.79
M-1	Source	1815.25	224.5	421.21	500	160	-76.26	-5.13	-3.29	-5.13	-5.13	-	-	0	-3.2	66.99
M-1	Source	1815.25	224.5	421.21	1000	158.7	-76.26	-9.12	1.19	-10.38	-10.38	-	-	0	0	64.12
M-1	Source	1815.25	224.5	421.21	2000	155.2	-76.26	-16.52	1.75	-12.75	-12.75	-	-	0	1.2	52.61
M-1	Source	1815.25	224.5	421.21	4000	151.9	-76.26	-41.99	1.75	-15.4	-15.4	-	-	0	1	21
M-1	Source	1815.25	224.5	421.21	8000	147.6	-76.26	-140.42	1.75	-18.22	-18.22	-	-	0	-1.1	-86.65
M-1	Source	1815.25	224.5	421.21	16000	144.9	-76.26	-506.25	1.75	-21.13	-21.13	-	-	0	-6.6	-463.6
M-2	Source	3025.51	223.45	421.21	31.5	179.1	-80.65	-0.07	5.9	-4.86	-4.86	-	-	0	-39.4	60.01
M-2	Source	3025.51	223.45	421.21	63	175.3	-80.65	-0.27	5.9	-4.94	-4.94	-	-	0	-26.2	69.12
M-2	Source	3025.51	223.45	421.21	125	164.5	-80.65	-1.03	-5.47	0	0.36	-	-	0	-16.1	61.24
M-2	Source	3025.51	223.45	421.21	250	149.1	-80.65	-3.44	-7.35	0	1.93	-	-	0	-8.6	49.06
M-2	Source	3025.51	223.45	421.21	500	160	-80.65	-8.5	-3.27	-2.71	-2.71	-	-	0	-3.2	61.66
M-2	Source	3025.51	223.45	421.21	1000	158.7	-80.65	-15.13	1.21	-6.93	-6.93	-	-	0	0	57.2
M-2	Source	3025.51	223.45	421.21	2000	155.2	-80.65	-27.4	1.77	-8.36	-8.36	-	-	0	1.2	41.75
M-2	Source	3025.51	223.45	421.21	4000	151.9	-80.65	-69.63	1.77	-10.3	-10.3	-	-	0	1	-5.92
M-2	Source	3025.51	223.45	421.21	8000	147.6	-80.65	-232.86	1.77	-12.66	-12.66	-	-	0	-1.1	-177.9
M-2	Source	3025.51	223.45	421.21	16000	144.9	-80.65	-839.53	1.77	-15.3	-15.3	-	-	0	-6.6	-795.41
M-3	Source	2355.21	204.5	421.21	31.5	179.1	-78.33	-0.05	5.86	-4.95	-4.95	-	-	0	-39.4	62.23
M-3	Source	2355.21	204.5	421.21	63	175.3	-78.33	-0.21	5.86	-5.12	-5.12	-	-	0	-26.2	71.3
M-3	Source	2355.21	204.5	421.21	125	164.5	-78.33	-0.79	-5.48	0	0.04	-	-	0	-16.1	63.8
M-3	Source	2355.21	204.5	421.21	250	149.1	-78.33	-2.63	-7.36	0	1.34	-	-	0	-8.6	52.17
M-3	Source	2355.21	204.5	421.21	500	160	-78.33	-6.51	-3.28	-3.7	-3.7	-	-	0	-3.2	64.98
M-3	Source	2355.21	204.5	421.21	1000	158.7	-78.33	-11.58	1.2	-8.44	-8.44	-	-	0	0	61.55
M-3	Source	2355.21	204.5	421.21	2000	155.2	-78.33	-20.98	1.76	-10.4	-10.4	-	-	0	1.2	48.45
M-3	Source	2355.21	204.5	421.21	4000	151.9	-78.33	-53.3	1.76	-12.77	-12.77	-	-	0	1	10.25
M-3	Source	2355.21	204.5	421.21	8000	147.6	-78.33	-178.26	1.76	-15.42	-15.42	-	-	0	-1.1	-123.75
M-3	Source	2355.21	204.5	421.21	16000	144.9	-78.33	-642.67	1.76	-18.24	-18.24	-	-	0	-6.6	-599.18
M-4	Source	1496.32	461.64	421.21	31.5	179.1	-74.61	-0.03	5.79	-4.77	-4.77	-	-	0	-39.4	66.08
M-4	Source	1496.32	461.64	421.21	63	175.3	-74.61	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	75.38
M-4	Source	1496.32	461.64	421.21	125	164.5	-74.61	-0.51	-5.49	0	0.72	-	-	0	-16.1	67.79
M-4	Source	1496.32	461.64	421.21	250	149.1	-74.61	-1.72	-7.38	0	2.61	-	-	0	-8.6	56.8
M-4	Source	1496.32	461.64	421.21	500	160	-74.61	-4.24	-3.3	-1.47	-1.47	-	-	0	-3.2	73.18
M-4	Source	1496.32	461.64	421.21	1000	158.7	-74.61	-7.54	1.18	-4.77	-4.77	-	-	0	0	72.96
M-4	Source	1496.32	461.64	421.21	2000	155.2	-74.61	-13.66	1.74	-4.77	-4.77	-	-	0	1.2	65.1
M-4	Source	1496.32	461.64	421.21	4000	151.9	-74.61	-34.7	1.74	-4.77	-4.77	-	-	0	1	40.56
M-4	Source	1496.32	461.64	421.21	8000	147.6	-74.61	-116.05	1.74	-4.77	-4.77	-	-	0	-1.1	-47.19
M-4	Source	1496.32	461.64	421.21	16000	144.9	-74.61	-418.41	1.74	-4.77	-4.77	-	-	0	-6.6	-357.75
M-5	Source	169.84	419.14	421.21	31.5	179.1	-55.21	0	4.06	0	-	-	-	0	-39.4	88.55
M-5	Source	169.84	419.14	421.21	63	175.3	-55.21	-0.01	4.06	0	-	-	-	0	-26.2	97.93
M-5	Source	169.84	419.14	421.21	125	164.5	-55.21	-0.06	-0.36	0	-	-	-	0	-16.1	92.78
M-5	Source	169.84	419.14	421.21	250	149.1	-55.21	-0.18	-7.54	0	-	-	-	0	-8.6	77.57
M-5	Source	169.84	419.14	421.21	500	160	-55.21	-0.45	-3.62	0	-	-	-	0	-3.2	97.51
M-5	Source	169.84	419.14	421.21	1000	158.7	-55.21	-0.81	0.68	0	-	-	-	0	0	103.37
M-5	Source	169.84	419.14	421.21	2000	155.2	-55.21	-1.46	1.22	0	-	-	-	0	1.2	100.95
M-5	Source	169.84	419.14	421.21	4000	151.9	-55.21	-3.72	1.22	0	-	-	-	0	1	95.19
M-5	Source	169.84	419.14	421.21	8000	147.6	-55.21	-12.44	1.22	0	-	-	-	0	-1.1	80.07
M-5	Source	169.84	419.14	421.21	16000	144.9	-55.21	-44.84	1.22	0	-	-	-	0	-6.6	39.47

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5

Point Sources	x	y	Height	Lw	Hz
Source	110.34	-11.5	2	179.1	31.5
-	-	-		175.3	63
-	-	-		164.5	125
-	-	-		149.1	250
-	-	-		160	500
-	-	-		158.7	1000
-	-	-		155.2	2000
-	-	-		151.9	4000
-	-	-		147.6	8000
-	-	-		144.9	16000

Ground Height Points	x	y	Height
-	134.08	295.24	480
-	514.08	-44.76	475

Ground Height Lines	x	y	Height
-	4476.27	2642.71	163
-	4430.44	2830.57	
-	4390.79	2796.89	
-	4201.84	2828.04	
-	4117.14	2864.1	
-	4098.98	2926.24	
-	4059.83	2971.18	
-	4011.51	2892.73	
-	3906.23	2834.88	
-	3824.28	2863.63	
-	3851.44	2784.45	
-	3811.91	2761.54	
-	3781.83	2689.14	
-	3742	2649.37	
-	3749.31	2601.68	
-	3791.18	2563.94	
-	3764.8	2488.74	
-	3773.32	2376.23	
-	3743.06	2360.98	
-	3687.72	2389.28	
-	3639.09	2389.21	
-	3535.5	2333.86	
-	3440.6	2250.16	
-	3416.01	2183.17	
-	3364.78	2120.28	
-	3372.67	2100.43	
-	3355.11	2100.73	
-	3388.22	1997.46	
-	3349.65	1865.71	
-	3366.62	1826.87	
-	3391.38	1935.46	
-	3464.55	1963.86	
-	3486.94	2004.47	
-	3519.04	2019.65	
-	3546.25	2121.98	
-	3653.14	2165.99	
-	3671.98	2282.77	
-	3764.26	2303.52	
-	3856.52	2368.63	
-	3940.82	2328.01	
-	3970.3	2287.25	
-	4019.57	2274.47	
-	4022.31	2292.04	
-	4124.68	2342.09	
-	4101.27	2381.59	
-	4107.37	2416.37	
-	4202.15	2523.69	
-	4283.96	2502.63	
-	4357.19	2438.58	
-	4363.94	2332.52	
-	4265.78	2257.63	
-	4178.56	2291.79	
-	4151.03	2283.02	
-	4199.26	2219.83	
-	4167.36	2192.97	
-	4138.45	2094.77	
-	4067.99	2086.64	
-	4063.55	2058.89	
-	4095.48	2017.32	
-	4128.51	2013.63	
-	4138.09	1941.77	
-	4178	1894.95	
-	4165.88	1861.5	
-	4255.87	1615.7	
-	4318.49	1539.34	
-	4382.92	1398.92	
-	4485.41	1294.85	
-	3594.69	3017.68	183
-	3645.24	2688.77	
-	3613.14	2673.89	
-	3588.39	2622.64	
-	3596.83	2558.97	
-	3572.11	2512.01	
-	3512.54	2496.05	
-	3419.5	2508.32	
-	3373.96	2471.03	
-	3329.68	2386.01	
-	3307.92	2383.31	
-	3312.02	2314.45	
-	3284.28	2210.16	
-	3232.54	2144.41	
-	3184.94	2145.89	
-	3272.35	2083.34	
-	3281.62	2043.17	
-	3269.04	2002.9	
-	3244.3	1991.11	
-	3235.51	1914.5	
-	3207.34	1915.27	
-	3195.96	1871.49	
-	3135.62	1808.15	
-	3165.66	1804.61	
-	3144.44	1776.45	
-	3162.67	1743.88	
-	3083.12	1685.93	
-	3063.16	1693.4	
-	2964.53	1640.22	
-	2870.85	1648.8	
-	2830.17	1605.47	
-	2799.61	1632.88	
-	2750.73	1633.43	
-	2728.07	1601.99	
-	2736.24	1570.55	
-	2717.33	1576.64	
-	2772.53	1483.59	
-	2770.73	1356.54	
-	2786.68	1338.7	
-	2824.25	1350.47	
-	2866.72	1329.11	
-	2896.16	1243.66	
-	2888.14	1125.91	
-	2923.34	1077.52	
-	2956.56	955.85	
-	2996.48	884.09	
-	3106	804.81	
-	3159.44	791.41	
-	3258.78	824.31	
-	3300.04	766.56	
-	3308.9	780.48	
-	3309.72	645.39	
-	3211.17	593.27	
-	3183.95	552.44	
-	3192.45	512.32	
-	3233.64	466.61	
-	3233.39	431.04	
-	3247.93	445.2	
-	3306.57	429.55	
-	3296.6	456.5	

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-	3314.19	464.32		
-	3272.53	524.22		
-	3289.52	507.2		
-	3327.76	570.78		
-	3426.14	650.88		
-	3459.02	713.82		
-	3478.57	818.24		
-	3469.96	930.75		
-	3492.7	1027.54		
-	3535.9	1105.11		
-	3512.35	1196.06		
-	3559.09	1259.78		
-	3574.64	1319.83		
-	3538.39	1332.32		
-	3522.64	1284.06		
-	3496.08	1276.34		
-	3342.46	1359.41		
-	3308.89	1402.24		
-	3363.1	1549.61		
-	3364.78	1632.65		
-	3417.19	1713.09		
-	3405.82	1831.54		
-	3506.53	1944.13		
-	3567.49	2087.38		
-	3675.23	2146.6		
-	3699.02	2212.77		
-	3727.21	1934.65		
-	3742.56	1957.08		
-	3753.32	1942.74		
-	3763.88	2097.35		
-	3802.63	1954.75		
-	3811.73	1981.13		
-	3823.85	1964		
-	3805.88	2268.86		
-	3887.74	2241.66		
-	3899.55	2191.91		
-	4028.1	2103.3		
-	4037.71	2028.61		
-	4100.34	1975.64		
-	4136.68	1889.99		
-	4108.07	1849.28		
-	4152.96	1821.6		
-	4224.07	1612.55		
-	4299.42	1518.06		
-	4341.39	1399.19		
-	4438.56	1271.46		
-	4485.41	1173.86		
-	4491.51	94.57	183	
-	4491.51	79.63		
-	4473.22	2998.58	183	
-	4431.61	2980.04		
-	4390.07	2913.96		
-	4202.89	2907.86		
-	4159.14	2935.69		
-	4104.34	3020.73		
-	4321.04	3023.78	183	
-	4378.05	2984.28		
-	4417.29	2991.32		
-	4439.62	3023.78		
-	1000.84	4502.06	203	
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-	991.32	4408.65		
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-	1075.41	4456.85		
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-	1041.26	4335.29		
-	1008.27	4260.53		
-	906.99	4243.27		
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-	915.7	4317.14		
-	892.65	4324.26		
-	888.74	4354.41		
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-	776.27	4159.86		
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-	815.66	3822.36		
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-	910.08	3857.41		
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-	959.1	3867.85		
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-	1050.36	3788.82		
-	1044.76	3740.2		
-	1107.14	3750.28		
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-	1080.47	3767.72		
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-	1128.82	3847.37		
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-	1192.99	3736.75		
-	1223.21	3734.98		
-	1242.64	3674.62		
-	1309.49	3611.09		
-	1245.85	3530.27		
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-	1265.72	3457.1		
-	1349.42	3503.21		
-	1418.05	3482.05		
-	1430.86	3532.15		
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-	1516.72	3669.66		
-	1504.93	3635.44		
-	1532.42	3633.49		
-	1532.37	3565.33		
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-	1435.43	3418.95		
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-	1411.48	2642.5		
-	1439.32	2603.02		
-	1423.25	2539.15		
-	1458.81	2529.71		
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-	1528.88	2459.87		
-	1497.89	2460.47		
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-	1468.95	2385.68		
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-	1507.38	2295.3		
-	1543.33	2148.74		
-	1564.02	2078.94		
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-	1782.33	2000.15		
-	1816.22	2021.08		
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-	1859.37	1914.33		
-	1895.15	1899.22		
-	1933.39	1912.26		
-	1955.87	1848.82		
-	1998.11	1835.06		
-	1965.79	1818.74		
-	1978.24	1786.31		
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-	2214.74	137.34		
-	2187.78	117.94		
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-	2275.14	145.94		
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-	2352.67	250.18		
-	2359.68	179.73		
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-	2499.39	-1249.18		
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-	2644.1	-969.01		
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-	1580.12	4244.83		
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-	1443.16	4374.93		
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-	3495.03	3017.68	203	
-	3525.4	2853.66		
-	3516.24	2750.31		
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-	3496.55	2624.36		
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-	3502.36	2549.92		
-	3381.49	2633.49		
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-	3166.31	2633.49		
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-	2744.48	2651.45		
-	2693.11	2617.26		
-	2541.56	2615.14		
-	2349.84	2562.45		
-	2370.2	2489.43		
-	2360.1	2468.95		
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-	2176.75	2476.32		
-	2141.47	2484.49		
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-	2098.8	2556.08		
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-	1934.16	2507.23		
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-	1906.33	2579.76		
-	1864.13	2626.46		
-	1781.33	2657.52		
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-	1736.06	2612.3		
-	1699.74	2667.14		
-	1699.61	2706.07		

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-	1601.5	-292.95		
-	1632.47	-322.98		
-	1649.77	-307.19		
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-	1769.62	-411.26		
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-	1818.55	-209.61		
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-	2114.78	207.88		
-	2104.29	223.18		
-	2018.8	167.94		
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-	2074.22	390.61		
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-	2076.07	565.48		
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-	1553.25	1909.56		
-	1507.51	1987.5		
-	1467.52	2006.67		
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-	1309.46	2117.23		
-	1220.17	2345.08		
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-	875.44	1825.84		
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-	837.26	1361.05		
-	881.13	1332.33		
-	807.23	1326.28		
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-	236.33	3371.39		
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-	2003.87	-2880.9		
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-	3679.12	2711.46		-
-	3831.22	2662.76		-
-	3882.49	2621.04		-
-	3907.17	2572.54		-
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-	3792.21	2502.12		-
-	3701.65	2451.55		-
-	3614.72	2439.36		-
-	3566.13	2453.62		-
-	3520.92	2494.82		-
-	3492.78	2529.64		-
-	3488.93	2579.87		-
-	3463.63	2589.05		-
-	3414.99	2576.29		-
-	3400.87	2543.74		-
-	3311.51	2554.53		-
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-	3275.9	2519.36		-
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-	2712.36	3114.29		-
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-	2666.01	3162.35		-
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-	-224.76	2817.81		-
-	-184.34	2801.3		-
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-	-209.78	2572.58		-
-	-217.52	2487.87		-
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-	624.72	658.8		-
-	647.02	512.24		-
-	639.85	529.9		-
-	702.14	451.26		-
-	706.36	371.02		-
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*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Â°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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5th NIPA

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FIFTH NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on December 15, 2023.

Based upon staff review of your proposal and the information submitted in response to the Agency's March 16, 2023 Fourth Notice of Incomplete Permit Application (NIPA), the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the March 16, 2023 Fourth Notice of Incomplete Permit Application was not submitted and is required to review the application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

January 2, 2024
Date

/s/ David J. Plante
David J. Plante, AICP CEP
Deputy Director, Regulatory Programs

Attachment: List of Requested Information

746

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this Notice by email to frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. The provided materials include a revised sound study prepared by H2H Geoscience Engineering PLLC (referred to herein as the Revised Noise Analysis). The noise modeling included in the Revised Noise Analysis utilizes receptor distance measurements from the proposed gravel pad, but does not clarify which portion of the 100-foot by 100-foot pad the measurements are made from, e.g. at the nearest edge or corner of the gravel pad, the center, or the furthest edge. Varying the location of the howitzer assembly on the gravel pad and the corresponding receptor distance could result in a discrepancy of 141-feet (hypotenuse of pad), which could skew or reduce the estimated sound pressure level in inverse proportion to the square of the distance or 6 dB at 100 feet. As stated in UCI's February 28, 2023, response to the Agency's Third NIPA, "…the specific placement of instrumentation and test articles will vary within a general range based on test requirements. All instrumentation and test articles are portable and will be emplaced before and after each test. As no permanent structures will be deployed, exact position of placement may vary each time."

Please provide cross-section sheet(s) depicting the proposed typical M109 155 mm howitzer and assembly set up to be utilized on site, including all proposed instrumentation and test articles, that is drawn to scale and depicts howitzer barrel and assembly dimensions and muzzle location. Please label the location of the noise source and its associated sound pressure level source height as measured from the finished grade of the pad.

To allow for review of worst-case scenario noise impacts, please provide scaled cross-section plan sheet(s) depicting the distance between the closest point of the proposed gravel pad or the noise source, whichever is closer, to each of M1-M5, and between the closest point of the proposed gravel pad and the receptor located at the southwest corner of the nearest state land parcel. Please depict the proposed berm on each of these plan sheets.

2. Please clarify what materials the berm will be constructed with, and any associated stabilization measures and other erosion and sediment controls.

3. Please provide an evaluation of other potential noise mitigation measures, including enclosures and/or silencers (schalldampfer). Please explain why none of these other noise mitigation measures are included as part of the proposal.

4. Please explain why there are separate tables, calculations and conclusions made in the UCI written response received on December 7, 2023, that are not included in the Revised Noise Analysis. For example, as indicated in the Appendix D, Model Data, the noise analysis model input of atmospheric absorption utilizes

20ºC (68ºF), and 70% humidity, and does not include an evaluation of varying weather conditions. However, UCI's written response does include information on varying weather conditions and provides separate tables, including Table 1 that references the modeled sound levels and states that "testing is not anticipated to take place under these conditions" referencing temperature 41ºF/humidity 0%. Another example of this discrepancy is that the UCI response states "(T)he modeled sound pressure level is 130 dB/107 dB(A) at M-5, and 132 dB and 111 dB(A)at State Land classified as Wild Forest property corner;" however this is not discussed or presented in the Revised Noise Analysis. In addition, the UCI response section references the July 2023 Sound Study and not the Revised Noise Analysis.

5. If testing will not be performed in late fall, winter, or spring conditions when the temperature of 41ºF/humidity 0% scenario is a seasonal possibility, please explain why the Revised Noise Analysis included noise monitoring conducted on December 21 and 22, 2022, but model inputs included summer conditions of 20ºC (68ºF), and 70% humidity. Please clarify the proposed months of operation and any other proposed atmospheric operating restrictions.

Additionally, application materials previously stated that there would be a maximum of two shots fired per day fired for a maximum of three consecutive days, with an average of 30 shots per year, and that shots would occur for a period of five years. The UCI Response received December 15, 2023, states that testing was not anticipated to take place at conditions of 41 degrees Fahrenheit and 0% humidity, and that conditions in the first column of Table 1 are typical for the project site during summer months. Please provide the proposed maximum number of firings per week, month, and year of the testing period.

6. Please revise Image 1 to depict the location of the 100-foot by 100-foot pad, all state land boundaries, the southwest corner of the nearest state land parcel located approximately 300 feet from the northeast corner of the firing pad, the nearest dwellings (including the Pulsifer residence), receptor locations M1 – M4, and the closest point of the proposed gravel pad or the noise source, whichever is closer, to each receptor.

7. A Norwegian study titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defense Research Establishment (FFI), and dated 5 December 2007 (the Norwegian study), is the only source of information included in the application providing noise level data from howitzers. This study includes a noise level of 130.5 dB measured at 803 feet from a howitzer. The Revised Noise Analysis appears to use this 130.5 dB measurement from the Norwegian study to calculate a modeled source noise level for an M109 155 mm howitzer of 180.8 dB. The Revised Noise Analysis then uses 180.8 dB to model noise levels at the M5 receptor on State land as 127 dB, and noise levels at the nearest residence as 100 dB. The Noise Analysis then determines that the 3.5-dB difference between the noise level data in the Norwegian Study and the modeled noise levels at the project site show "correlation within ISO standards."

Please provide an explanation of these ISO standards and the asserted correlation, including a clarification of whether the ISO standards are appropriately used in this context. Please also provide any other available documentation confirming that 3.5 dB is appropriately cited as the maximum limit of error for this proposal.

Please confirm through field-verification at an authorized location and through independent third party verifications that 180.8 dB is the noise level produced by M109 155 mm howitzers.

Please note that NYSDEC's Program Policy "Assessing and Mitigating Noise Impacts" dated October 6, 2000 last revised February 2, 2001 states that "In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive." The approximate noise level of 127 dB does not appear to be in character with the recorded ambient noise level of approximately 37.2 dBA, which per NYSDEC's noise policy, is most similar to wilderness noise levels at approximately 35 dBA.

8. The "Noise emission data for M109, 155 mm field howitzer" study referenced in the Revised Noise Analysis references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency July 18, 2022 reference the sound level for a M4A2 zone 7 charge. Please confirm that this will be the maximum charge used. Please also explain how the two charges compare and the effect will have on the level of sound produced.

9. Please provide an updated noise analysis that accounts for the confirmed height of the noise source from the gravel pad and the location of the noise source at the closest point of the gravel pad to each receptor. This updated noise analysis must include all tabular, calculated, and conclusory information included in the latest UCI response, Modal Data in Appendix D, and barrier attenuation calculations that account for the most conservative/worst case scenario height and location of the noise source in relation to each receptor. The updated noise analysis must also account for all proposed months of operation and any proposed atmospheric operating restrictions. In addition, the analysis must include revised tabular information, Modal Data in Appendix D, and barrier attenuation calculations that account for the height and location of the noise source in relation to each receptor, and must include sound pressure levels expressed as both dB and dBA. This updated analysis must include a cover sheet with the seal of a NYS licensed professional engineer.

cc: Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Les Howard, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

5th NIPA - Appeal Deadline Extension Request

750

NORFOLK BEIER PLLC
ATTORNEYS AT LAW

January 18, 2024

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: January 18, 2024

Via Email
Adirondack Park Agency
Fritz Aldinger, EPS1
1133 NYS Route 86
Ray Brook, New York 12977
frederick.aldinger@apa.ny.gov

Re: Fifth Notice of Incomplete Permit Application
APA Project No. 2021-0276

Dear Fritz:

On January 2, 2024, we received the Adirondack Park Agency's (the "Agency") Fifth Notice of Incomplete Permit Application concerning APA Project No. 2021-0276. The deadline to file an appeal of this determination is February 1, 2024. On behalf of the Project Sponsor, Mr. Michael Hopmeier, and Unconventional Concepts, Inc., I hereby request a 30-day extension of the appeal filling deadline. The request is made pursuant to 9 NYCRR §572.22(c). A deadline extension to March 1, 2024, will allow the project team, including my office, the necessary time to prepare and submit a comprehensive appeal succinctly addressing the material matters. As you know, the record of this application is quite voluminous. It should be noted that my client has agreed to several extensions for the Agency to respond to submissions we filed.

Thank you for your consideration of this request.

Sincerely,

Norfolk Beier PLLC

By: Matthew D. Norfolk, Esq.

cc: Mr. Michael Hopmeier

Agency Response

752

January 18, 2024

Matthew D. Norfolk, Esq.
1936 Saranac Ave, Suite 106
Lake Placid, NY 12946

Re: APA Project No. 2021-0276

Dear Matthew Norfolk:

The Agency has received your request for a 30-day extension of the deadline to file an appeal regarding the Agency's January 2, 2024, Fifth Notice of Incomplete Permit Application (NIPA) for Project Application 2021-0276.

The deadline to appeal the NIPA is hereby extended until March 1, 2024.

Sincerely,



David J. Plante, AICP CEP
Deputy Director, Regulatory Programs

5th NIPA Appeal

754

NORFOLK BEIER PLLC
ATTORNEYS AT LAW

RECEIVED
ADIRONDACK PARK AGENCY
FEB 29 2024

February 29, 2024

Via Email and Hand Delivery

John Burth, Environmental Specialist
NYS Adirondack Park Agency
1133 NYS Route 86
P.O. Box 99
Ray Brook, New York 12977

Dan Wilt, Chairman – Committee on
Regulatory Programs
NYS Adirondack Park Agency
1133 NYS Route 86
P.O. Box 99
Ray Brook, New York 12977

David Plante, Deputy Director
for Regulatory Programs
NYS Adirondack Park Agency
1133 NYS Route 86
P.O. Box 99
Ray Brook, New York 12977

Christopher E. Cooper, General Counsel
NYS Adirondack Park Agency
1133 NYS Route 86
P.O. Box 99
Ray Brook, New York 12977

Re: Project Sponsor: Michael Hopmeier, Unconventional Concepts, Inc.
APA Project No. 2021-0276

Dear Sirs:

Please find enclosed the Project Sponsor's appeal of the Fifth Notice of Incomplete Permit Application in connection with the above-referenced matter. The appeal is being filed pursuant to 9 N.Y.C.R.R. §572.22.

If you have any comments or questions please do not hesitate to contact me.

Sincerely,

Norfolk Beier PLLC

By:
Matthew D. Norfolk, Esq.
MDN:klm
Enc.

cc: Mr. Michael Hopmeier (Via Email Only)
Lori Settle (Via Email Only)
Erin Burns, Deputy Regional Permit Administrator NYDEC (Via First Class Mail Only)

The Outpost Plaza | 1936 Saranac Avenue, Suite 106 | Lake Placid, New York 12946
O: 518.302.8080 | F: 518.302.7100
www.norfolkbeier.com

755

NEW YORK STATE ADIRONDACK PARK AGENCY

In the Matter of APA Project No. 2021-0276,
Commercial Use – Ballistics Testing Facility
Project Sponsor: Michael Hopmeier of Unconventional Concepts, Inc.

APPEAL OF FIFTH NOTICE OF INCOMPLETE APPLICATION

Please take notice that, pursuant to 9 NYCRR §572.22(a), Project Sponsor Michael Hopmeier of Unconventional Concepts, Inc. (hereinafter referred to as "UCI") appeals, in part, *Fifth Notice of Incomplete Application*, dated January 2, 2024 (hereinafter referred to as the 5th NIPA), an action taken by David J. Plante, Deputy Director of Regulatory Programs of New York State Adirondack Park Agency (hereinafter referred to as the "Agency"); and

Please take further notice that this appeal is being filed on behalf of UCI by the law firm of Norfolk Beier PLLC, with Matthew D. Norfolk, Esq. being of counsel and UCI's Authorized Representative herein; and

Please take further notice that this appeal seeks a determination finding that: (1) all requests for information contained in the 5th NIPA are duplicative, unnecessary or moot as all information required for the project application to be complete has been submitted by UCI; (2) certain requests for information contained in the 5th NIPA are lacking relevancy to attaining a determination of application completion; (3) certain comments contained in the 5th NIPA must be stricken from the administrative record as they are based upon factual errors; (4) certain comments contained in the 5th NIPA must be stricken from the administrative record as they were made by Agency Staff in an unlawful attempt to issue a *de facto* denial of the application; (5) certain comments contained in the 5th NIPA must be stricken from the administrative record as they were made by Agency Staff in an unlawful attempt to alter or change the proposed project or use,

contrary to the intentions of UCI or prejudicial to UCI; (6) UCI's project application is complete; and, (7) pursuant to 9 NYCRR §572.22(h), providing notice of the completeness of the application as required by law and thereafter granting the permit application.

BACKGROUND FACTS AND PROJECT REVIEW HISTORY

Mr. Hopmeier is the President of UCI. UCI is a professional engineering and technical consulting firm specializing in issues related to national security. Typical projects involve high value, time critical programs which do not necessarily fall under the purview of conventional consulting firms or government agencies. Areas of expertise encompass development and transitioning of technologies from and to civilian, commercial, military, and government sectors. UCI does comprehensive strategy and policy reviews to validate concepts of application and operations. UCI has been instrumental in transitioning technologies through cooperative research and development agreements, cooperative agreements and commercial licensing agreements to support university and commercial sector research and development. UCI has also been instrumental in new business development and has supported the transition of explosive ordnance disposal training devices, medical testing equipment and antimicrobial solutions into commercial applications. UCI is a registered vendor in the United Nations Global Marketplace as a supplier to the United Nations.

The United States Army awarded UCI a contract to test and evaluate internal ballistics and kinetic and kinematic effects of various kinetic systems used by the United States military. In 2015, UCI purchased the decommissioned thermonuclear Atlas F missile launch facility located at 87 Hale Hill Lane in the Town of Lewis, New York (Tax Map Parcel No. 38.1-1-29.000).

Neighboring land at 195 Hale Hill Lane (Tax Map No. 38.1-1-31.000) was selected as the test site for its ideal physical attributes suited for kinetic system testing, requirements for minimal

environmental development, noise mitigation and site security. The terrain will act as a natural mitigator of sound. The site's isolation and controlled access also enhances safety and security.

On August 26, 2021, UCI submitted a Jurisdictional Inquiry Form to the Agency regarding development of a ballistic testing range at 195 Hale Hill Lane for purposes of performing under said contract with the United States Army. The Agency issued Jurisdictional Determination J2021-0870 on September 22, 2021, asserting jurisdiction "for any new commercial use on Rural Use lands in the Adirondack Park."

On November 12, 2021, more than two years ago, UCI submitted an application for the ballistics testing project. The project is described in paragraph 8 of the "Detailed Project Description," at pages 25-26 of the project application. Excerpts of the description are the following:

- **The range will have very limited access, be used sporadically throughout the year, and will only be used during daylight hours.**

- **All test equipment and instrumentation will be portable; equipment will be deployed as needed to the site for a test and will then be completely removed at the end of the test. No more than three tests per month are anticipated. Each test will consist of 1-3 shots, and each series of shots will last no more than 2 days. Local property owners who may be impacted (by noise) will be notified a minimum of one week in advance of the anticipated test. Testing will only occur on weekdays, between the hours of 10:00 AM and 4:00 PM local time.**

- **To minimize the impact on the local community and area, we plan to notify all interested parties (a list will be provided by the local town supervisor, consistent with the list used by the local mining operation), and each party will be notified a minimum of one week in advance prior to any firing. In addition, 24 hours prior to any firing, local law enforcement and 911 will also be notified in the event that anyone from the local community expresses concern. Further, we will invite local officials, to include elected representatives and law enforcement, to attend and observe operations as they occur. However, operations will not be open to the public; observation will be limited due to safety and security concerns.**

- **At the completion of each test series, all equipment, residue, and debris will be cleaned up and transported or managed on site appropriately. Debris will principally consist of the steel projectiles and any rubble created from impact with the ground.**

- **Continuous noise, primarily from the generator, is not expected to exceed 65 dB. Impulse noise with durations of less than one half of one second is not expected to exceed 180 dB.** (UCI's Application, "34. Operating Profile: Machinery" p. 29).

First Notice of Incomplete Permit Application

Agency Staff's *First Notice of Incomplete Permit Application* (hereinafter referred to as the "1st NIPA") was issued on December 6, 2021. A copy of the 1st NIPA is annexed hereto as **Attachment A**. In the 1st NIPA, Agency Staff requested "a thorough noise evaluation for all proposed munitions to be fired on site, including an evaluation of the nearest receptors utilizing the NYS DEC's Program Policy for Assessing and Mitigating Noise Impacts." In particular Agency Staff requested "a noise mitigation plan as necessary." (*See* Attachment A, p. 2).

On December 22, 2021, UCI submitted responsive documents (hereinafter referred to as "UCI's Response to 1st NIPA"). UCI explained in its response that "[t]he noise generated during testing is considered to be impulse noise rather than constant noise. It is vital to note that impulse noise affects people and the environment very differently than continuous noise, and is generally considered less annoying and impactful." (*See* UCI's Response to 1st NIPA, p. 3). UCI provided a noise map report based on non-linear topographical multi-variant inverse-square law modeling for the attenuation of the intensity of noise and provided an explanation of the selected values. (*See id.*, pp. 3-4 and Appendix B). This method was chosen as representing existing best practices and state-of-the-art analysis performed by audio engineer experts.

In compliance with New York State Department of Environmental Conservation (hereinafter referred to as the "DEC") *Program Policy for Assessing and Mitigating Noise Impacts*, Section V.B.1.b, the nearest inhabited receptor location of differing use than the proposed noise source was selected, being the Pulsifer residence, 1.22 miles away. (*See id.*, p. 4). In support of the selected 183 dB value for the noise source, UCI cited a reliable and recognized study published in the *Scandinavian Audiology* journal, as well as a list of noise levels of common military

equipment promulgated by the US Army Center for Health Promotion and Preventative Medicine Hearing Conservation Program. (*See DEC Program Policy*, pp. 3-4). UCI also provided comparison values for hunting firearms commonly used in the Adirondack Park and noted "noise at the receptor site is still projected to be at or below a wide array of existing and approved noise sources." (*See* UCI's Response to 1st NIPA, p. 4). In other words, the sound to be made from the ballistics testing, at the testing receptors, was equal to or less than that produced by the firing of a legal big game hunting rifle.

For noise impact mitigation, UCI proposed a procedure similar to that used and approved by the Agency for local mining operations. Furthermore, the result of UCI's studies and research found that "[b]ased on existing data and assessment, noise levels are not anticipated to exceed those produced by blast operations currently occurring one mile from the proposed site of the firing range." (*See* UCI's Response to 1st NIPA, p. 5).

Second Notice of Incomplete Permit Application

The Agency's *Second Notice of Incomplete Permit Application* (hereinafter referred to as the "2nd NIPA") was issued on January 13, 2022. A copy of the 2nd NIPA is annexed hereto as **Attachment B**. Without a coherent, scientific, or factually based rationale, Agency Staff disputed UCI's calculated noise pressure level for the noise source and requested "a more complete noise assessment report" to include all potential noise receptors within a minimum 2.0-mile radius from the munition firing source of 185 dBa. Agency Staff opined that the revised assessment report "should provide a detailed evaluation of the potential noise impacts to these receptors with respect to ambient sound pressure level." (*See* Attachment B, p. 2). In response, on February 11, 2022, UCI submitted a comprehensive response to the 2nd NIPA (hereinafter referred to as "UCI's

Response to 2nd NIPA"). Therein, UCI provided a revised sound map with an increased impulse noise value of 185 dB(A). (*See* UCI's Response to 2nd NIPA, Attachment A).

On March 1, 2022, by letter, Agency Staff requested supplemental information. A copy of this letter is annexed hereto as **Attachment C**. On May 12, 2022, UCI provided supplemental responses to Agency Staff's March 1, 2022 request (hereinafter referred to as "UCI's Supplemental Response"). UCI's Supplemental Response included an updated noise assessment indicating an ambient noise level at the Pulsifer residence of 80 dB based on that receptor's proximity to a sawmill and diesel truck refueling site. (*See* UCI's Supplemental Response, p. 3, Appendix D). The updated noise assessment included a detailed paragraph-by-paragraph breakdown of the computations, reasons for their selection, and explanation of the methodology used to conclude the impulse noise from the ballistic testing will not exceed the ambient noise level at the nearest off-site residence. (*See id.*, pp. 12-33, Appendix D). The supplemental response also provided Agency Staff with UCI's *Sound Mitigation and Control Annex of the Security and Safety Plan* concerning the proposed project. (*See id.*, pp. 4-6).

Third Notice of Incomplete Permit Application

Agency Staff's *Third Notice of Incomplete Permit Application* (hereinafter referred to as the "3rd NIPA") was issued on June 6, 2022. A copy of the 3rd NIPA is annexed hereto as **Attachment D**. Alarmingly, in the 3rd NIPA, Agency Staff expressly stated, with emphasis, that "based on potential noise impacts alone, absent revisions to the project proposal, the project *does not meet the criteria for issuance of a permit under Agency law.*" (*See* Attachment D, p.4.).

First, as a matter of law, Agency Staff lacks the power to decide whether a permit application should be granted or denied. Agency Staff's duty is to review the project application and determine when it is complete and, if appropriate, provide recommendations to the regulatory

committee based on a complete application. Second, Agency Staff made this conclusion before it had even deemed the application complete for review. In contradictory fashion, Agency Staff asserted its disapproval of the project while at the same time taking the position that UCI had not provided enough information to have the application ready for review. Notably, Agency Staff offered no reasoned basis for its conclusion that the "potential noise impacts alone" warrant a denial of the application.

Agency Staff's adverse perception of the project suggested what UCI has long suspected—that Agency Staff has a predisposition toward the proposed ballistic testing that it will produce noise that will cause unacceptable adverse impacts on the environment and neighboring properties. With the issuance of the 3rd NIPA, UCI became increasingly concerned that Agency Staff tended to notice only certain aspects of the project while ignoring other details (details that support approval of the project application) or that Agency Staff did not fully comprehend the science of sound and sound acoustics being presented and relied upon by UCI. In effect, Agency Staff was capriciously and arbitrarily disregarding information provided by UCI, or drawing conclusions divorced from both science and reality.

In response to Agency Staff's inappropriate and premature finding, UCI replied "[t]here is no basis at this stage of the application process for Agency Staff to come to the underscored conclusion that the project does not meet the criteria for issuance of a permit 'based on the potential noise impacts alone' or otherwise. It is apparent from the Third Notice of Incomplete Application that Agency Staff members, themselves, believe more information is needed to properly review and assess UCI's project application. The precipitous conclusion that the application will be denied is a cause for concern that Agency Staff may be straying from the rational and logical model of decision making embodied in Agency regulations to a predisposed decision-making model

where decisions are made based on personal preferences and opinions regardless of the data and whether or not the decision is actually right." (*See* UCI's Response to 3rd NIPA).

In line with Agency Staff's expressed disposition, Agency Staff once again disagreed with UCI's estimation of the sound pressure level for the noise source in the 3rd NIPA. No rationale was provided for this disagreement. In spite of UCI supplying external documents recognized by qualified engineers and scientists supporting the sound pressure level estimations, Agency Staff provided no coherent reason for its rejection of UCI's estimations. Agency Staff again requested a revised sound assessment and noise mitigation plan. (*See* Attachment D, Comment 2.)

On February 28, 2023, UCI supplied responsive documents to the 3rd NIPA (hereinafter referred to as "UCI's Response to 3rd NIPA"). Included in UCI's response was a sound study prepared by H2H Geoscience Engineering, PLLC (hereinafter referred to as "H2H") in accordance with the requirements set forth by Agency Staff and the DEC. H2H is a recognized and respected engineering firm that has regularly presented information to the Agency and other State agencies and has extensive scientific and technical expertise in the science of sound, well in excess of that residing within the Agency. Agency Staff nonetheless was provided the opportunity to review and accept the proposed test plan prepared by H2H. Agency Staff, with minor and irrelevant modifications, approved this plan prior to its implementation. H2H then conducted sound level monitoring on December 20, 2022, and December 21, 2022, at five Agency-approved sound level monitoring locations surrounding the project site to best determine ambient sound level conditions in the area.

H2H's February 2023 Sound Study determined the modeled impulse sound level produced by two test shots per day from the Sound Source (M109, 155mm Field Howitzer) would produce a modeled change in ambient sound level below 3 dB at monitoring locations M-1, M-2, M-3, and

M-4, indicating no appreciable change to ambient sound levels at all identity residential receptors. There were no appreciable changes to the ambient sound levels at four of the five State Land parcels classified as Wild Forest. (*See* February 2023 Sound Study, p. 8). Receptor R-43 in State Wild Forest land, which has no identified public trails or other means of public access and is adjacent to the firing pad, showed a modeled impulse sound level of 107 dB(a). (*See id.*). H2H noted this is 26 dB less than the 133 dB limit for rock mining air blasts measured at the closest structure outside permitted areas that applies to the nearby mining operations during blasting, which are adjacent to lands classified as Wilderness – the most protected and restrictive State land classification. (*See id.*, p. 10). In its February 2023 report, H2H concluded "the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area." (*See id.*). Agency Staff offered no recognized studies nor technical papers accepted by the science and engineering communities to challenge H2H's conclusion.

Fourth Notice of Incomplete Permit Application

Agency Staff's *Fourth Notice of Incomplete Permit Application* (hereinafter referred to as the "4th NIPA") was issued on March 16, 2023. A copy of the 4th NIPA is annexed hereto as **Attachment E**. Agency Staff again disagreed with UCI's supplied documents and calculations and irrationally, and without explanation, characterized H2H's February 2023 sound study as "unacceptable." (*See* Attachment E, Comment 2). At this juncture, UCI and its project team determined that Agency Staff was requesting immaterial information or repeating its numerous requests for pertinent information simply to make more requests and perhaps prolong the application process, or Agency Staff was making such requests because it did not comprehend the science and did not know what questions to ask.

On July 31, 2023, UCI submitted responsive documents to the 4th NIPA (hereinafter referred to as "UCI's Response to 4th NIPA"). UCI noted that there was a transcription error in H2H's report concerning sound power levels between dB and dB(A) and further explained how the Norwegian Defense Research Establishments study is one of the only detailed sources of information available concerning sound pressure levels from howitzers. (*See* UCI's Response to 4th NIPA, p. 4).

On August 16, 2023, by letter, Agency Staff requested further information concerning noise mitigation measures and sound pressure level calculations. A copy of this letter is annexed hereto as **Attachment F**. On December 15, 2023, UCI submitted responsive documents (hereinafter referred to as "UCI's Second Supplemental Response"). UCI's Second Supplemental Response contained H2H's September 2023 Sound Study.

Although further noise mitigation efforts were not and are not necessary, as explained to Agency Staff by UCI in prior submissions, UCI proposed installation of a semi-permanent 13-feet tall berm along the firing pad and provided H2H's revised sound study to include the effect of the mitigation feature on sound levels at the receptors. (*See* UCI's Second Supplemental Response, p. 1, H2H's September 2023 Sound Study). The purpose of the implementation of a berm in the project design was simply to appease Agency Staff. Agency Staff continued to demand more mitigation without specifying why or the objective. In effect, Agency Staff demanded a burdensome task of making the berm higher without ever stating why or how high, creating a situation where no answer would ever be acceptable, seemingly designed to extend the application process, to delay final review and discourage further action by UCI.

Notwithstanding the foregoing, the modeled change in ambient sound levels at all identified residential receptors (M-1, M-2, M-3 and M-4) with the sound mitigation berm are

below 3 dB(A). (*See* September 2023 Sound Study, pp. 9-10). There were no appreciable changes to the ambient sound levels at four of the five State Land parcels identified as Wild Forest. (*See* September 2023 Sound Study, pp. 9-10). Receptor M-5 at parcel R-45 (State Land identified as Wild Forest) adjacent to the firing pad showed a modeled impulse sound level of 100 dB(A) with the sound mitigation berm. (*See id.*). Based on the information presented in the report, H2H again concluded "the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area." (*See id.*, p. 12).

UCI also explained in its supplemental response that temperature and humidity create minimal fluctuations on modeled sound levels at the receptors. UCI included a table prepared by H2H which evaluated five different weather condition testing scenarios: the lowest being 41°F at 0% humidity and the highest being 95°F at 95% humidity. Based on the evaluations, 3 dB(A) is the greatest sound pressure variance. The average weather conditions of 68°F at 70% humidity was, thus, used in the Sound Study. (*See* UCI's Second Supplemental Response, pp. 1-2). UCI further explained in the supplemental response, using H2H tables and calculations, how the data supplied was uncorrected and provides worst-case scenario results. UCI also clarified to Agency Staff the DEC Mine Land Reclamation Permit dB pressure level requirements. (*See id.*, pp. 2-6).

On January 2, 2024, Agency Staff issued the *Fifth Notice of Incomplete Permit Application* (hereinafter referred to as the "5th NIPA"). A copy of the 5th NIPA is annexed hereto as **Attachment G**.

ANALYSIS

Below, those portions labeled "Comment" are taken directly from the 5th NIPA (Attachment G). The "Objection" that follows each Comment provides justification for the Agency Board to render a determination that the particular Comment is unnecessary and no response is needed.

A. Comment No. 1 (p. 2):

- Comment: The provided materials include a revised sound study prepared by H2H Geoscience Engineering PLLC (referred to herein as the Revised Noise Analysis). The noise modeling included in the Revised Noise Analysis utilizes receptor distance measurements from the proposed gravel pad, but does not clarify which portion of the 100-foot by 100-foot pad the measurements are made from, e.g. at the nearest edge or corner of the gravel pad, the center, or the furthest edge. Varying the location of the howitzer assembly on the gravel pad and the corresponding receptor distance could result in a discrepancy of 141-feet (hypotenuse of pad), which could skew or reduce the estimated sound pressure level in inverse proportion to the square of the distance or 6 dB at 100 feet. As stated in UCI's February 28, 2023, response to the Agency's Third NIPA, '…the specific placement of instrumentation and test articles will vary within a general range based on test requirements. All instrumentation and test articles are portable and will be emplaced before and after each test. As no permanent structures will be deployed, exact position of placement may vary each time.'

  Objection: **With this comment, Agency Staff ignores previously submitted information and things and wrongfully concludes more information is needed. As put forth in previous submissions, the 155 mm howitzer barrel assembly will be located in the center of the 100-foot by 100-foot firing pad. The center of the 100-foot by 100-foot firing pad was used as the sound source in the sound propagation model. However, moving the sound source to the end of the gravel pad (a maximum of 70 feet toward a receptor) has negligible effects on the projected sound level due to the distance from the sound source to each monitoring location.**

- Comment: Please provide cross-section sheet(s) depicting the proposed typical M109 155 mm howitzer and assembly set up to be utilized on site, including all proposed instrumentation and test articles, that is drawn to scale and depicts howitzer barrel and assembly dimensions and muzzle location. Please label the location of the noise source and its associated sound pressure level source height as measured from the finished grade of the pad."

  Objection: **This request is redundant as UCI has provided the information sought in response to previous NIPAs. For example, UCI has already provided information concerning the height of the sound source, on page 8 of Appendix D to H2H's September 2023 Sound Study. This Study specifies "a Sound Source height of 6.5 feet." Additionally, the request, in part, seeks irrelevant or immaterial information. The sound created by the firing of a howitzer has been established by UCI. A depiction of a 155 mm howitzer and assembly dimensions of its barrel do not need to be known to consider and accept UCI's sound studies. UCI and its Project Team do not understand how having cross-section sheets depicting a "typical howitzer and assembly set up" will assist Agency Staff and the Agency Board in reviewing the application. Again, UCI has repeatedly provided the location of the sound source. The timing of this**

request is also troubling. This application has been pending for years. Agency Staff never requested such information about howitzers. Notwithstanding the foregoing, the information Agency Staff seeks regarding the instrumentation and test articles to be used and the howitzer assembly is information proprietary to UCI as well as sensitive national security information which UCI is not at liberty to release. This had been made known to Agency Staff in previous discussions. Agency Staff noted that they could not protect sensitive information and, therefore, it should not be provided.

Comment: To allow for review of worst-case scenario noise impacts, please provide scaled cross-section plan sheet(s) depicting the distance between the closest point of the proposed gravel pad or the noise source, whichever is closer, to each of M1-M5, and between the closest point of the proposed gravel pad and the receptor located at the southwest corner of the nearest state land parcel. Please depict the proposed berm on each of these plan sheets.

Objection: **For the first time, Agency Staff is requesting cross-section plan sheets requiring measurements from five (5) different locations on the firing pad in relation to each receptor. UCI has said over and over again that the sound source (*i.e.*, the howitzer) will be placed in the center of the firing pad. It will not be placed on different locations of the firing pad. Nonetheless, such requested documents, if supplied, would provide negligible new information for Staff Agency to consider. The studies and science UCI has already provided to Agency Staff demonstrate this.**

Without waiving this objection, to demonstrate the negligible effect the location of the sound source on the firing pad has on calculated sound levels at receptors, please see Tables 1 and 2 below reflecting sound pressure levels as calculated from the center and edge (70 feet closer to source) of the firing pad using the following formula (previously used in UCI's Second Supplemental Response):

$$L_p = L_W - \left|10 \cdot \log\left(\frac{Q}{4\pi \cdot r^2}\right)\right|$$

Lp = Sound Pressure Level
Lw = Sound Power level = 163.2 dB(A) (barrel of the M109, 155mm howitzer)
Q = Directivity factor = 2 (Hemispherical Sound Propagation)
r = Distance to source (meters)

Table 1: Sound Source Center of Firing Pad

Calculated Sound Pressure Level at Monitoring Locations

Monitoring Location	Distance From center of grave pad to Monitoring Location (ft.)	Calculated Sound Pressure Level dB(A)
M-1	5,955	90.0
M-2	9,925	85.6
M-3	7,726	87.8
M-4	4,908	91.7
M-5	554	110.7
State Land Corner	350	114.7

Table 2: Sound Source Edge of Firing Pad

Calculated Sound Pressure Level at Monitoring Locations

Monitoring Location	Distance From Closest Edge of gravel pad to Monitoring Location (ft.)	Calculated Sound Pressure Level dB(A)
M-1	5,905	90.1
M-2	9,875	85.6
M-3	7,676	87.8
M-4	4,858	91.8
M-5	504	111.5
State Land Corner	400	113.5

Based on the above, moving the sound source 70 feet to the edge of the firing pad has a maximum increase of 1.2 dB(A) at the Wild Forest Property Corner, 0.8 dB(A) at M-5, and less than 0.1 dB(A) at the remaining monitoring locations. Thus, moving the sound source to the edge of the firing pad "to provide a worst-case scenario," does not have a significant effect on results and producing a revised study is trivial.

Finally, the location of the proposed sound mitigation berm is shown on Figure 2 of H2H's September 2023 Sound Study and the height of said berm is 13 feet as indicated on page 8 of the same study. The information requested was previously provided. A request for the information again will not lead to a different response.

B. Comment No. 2 (p. 2):

- Comment: Please clarify what materials the berm will be constructed with, and any associated stabilization measures and other erosion and sediment controls.

Objection: The proposal for providing a berm to mitigate noise was only provided to appease Agency Staff and is proposed without technical necessity or requirement. Lacking specific technical criteria, this question cannot be

answered. Pending the APA providing specific technical data this question is considered irrelevant.

C. Comment No. 3 (p. 2):

- Comment: Please provide an evaluation of other potential noise mitigation measures, including enclosures and/or silencers ([S]challdampfer). Please explain why none of these other noise mitigation measures are included as part of the proposal.

  Objection: **Agency Staff is effectively dictating the design of the project; a design in which UCI has no intention of adopting. Firing of the 155 mm howitzer assembly within an enclosed structure defeats the purpose of testing the equipment in simulated real-use conditions. Furthermore, installation of a silencer is not only cost prohibitive, but such modification will render test results unusable. Agency Staff's request suggests that Agency Staff does not understand the objective of the ballistic testing UCI intends to conduct, which UCI has repeatedly stated in the application and the applicable responses to the first four NIPAs.**

  Agency Staff is also directing an open-ended unanswerable challenge, that being more mitigation, yet will not identify how much more mitigation is needed or when there is enough, nor explain the reasons why more mitigation is needed. Agency Staff has consistently refused to provide any boundaries to its requirements and repeatedly demonstrated its lack of understanding of the underlying science. In one interaction, an Agency Staff member (reputed to be a technical expert) demonstrated their lack of understanding by attempting to compare the impulse noise of the howitzer with the takeoff noise associated with an F-35 aircraft. When an attempt was made to explain that these were two different and unrelated issues, the Staff member treated the response with contempt and blithely moved on to another topic.

  Furthermore, mitigation measures currently proposed include the remote location of the site, the natural topographic rise between the sound source and all residential receptors, and the construction of a sound mitigation berm. No additional mitigative measures are proposed nor are necessary due to the findings on page 12 of H2H's September 2023 Sound Study wherein "the proposed project does not pose a potential significant environmental impact due to an increase in sound levels at receptors in the area." Agency Staff is making a bald assumption that additional mitigation measures are needed without explanation and fails to realize UCI has already met all regulatory requirements. There is no need to implement additional mitigation measures to achieve already extant standards.

D. Comment No. 4 (pp. 2-3):

- **Comment**: Please explain why there are separate tables, calculations and conclusions made in the UCI written response received on December 7, 2023, that are not included in the Revised Noise Analysis. For example, as indicated in the [sic] Appendix D, Model Data, the noise analysis model input of atmospheric absorption utilizes 20°C (68°F), and 70% humidity, and does not include an evaluation of varying weather conditions. However, UCI's written response does include information on varying weather conditions and provides separate tables, including Table 1 that references the modeled sound levels and states that 'testing is not anticipated to take place under these conditions' referencing temperature 41°F/humidity 0%. Another example of this discrepancy is that the UCI response states "(T)he modeled sound pressure level is 130 dB/107 dB(A) at M-5, and 132 dB and 111 dB(A) at State Land classified as Wild Forest property corner;" however this is not discussed or presented in the Revised Noise Analysis. In addition, the UCI response section references the July 2023 Sound Study and not the Revised Noise Analysis.

  Objection: This is a redundant request. UCI has already provided information to Agency Staff on this matter (*see* UCI's Second Supplemental Response). The information is not included in the September 2023 Sound Study because the analysis in UCI's Second Supplemental Response demonstrates that temperature and humidity do not make a significant impact on results and do not change the study's findings. The July 2023 Sound Study is referenced in the written response only to indicate where information requested by Agency Staff had already been provided.

E. Comment No. 5 (p. 3):

- **Comment**: If testing will not be performed in late fall, winter, or spring conditions when the temperature of 41°F/humidity 0% scenario is a seasonal possibility, please explain why the Revised Noise Analysis included noise monitoring conducted on December 21 and 22, 2022, but model inputs included summer conditions of 20°C (68°F), and 70% humidity.

  Objection: Ambient sound monitoring was conducted December of 2022 to avoid delaying the ambient sound study until spring of 2023. Ambient sound levels will be lower during winter months due to the absence of insects and less animal activity. Snow further dampens sound attenuation. Thus, the ambient sound levels collected during December provide a conservative ambient sound assessment for the tests. Using these more conservative ambient sound levels with modeled summer conditions for the sound study results in more pronounced sound levels in "worst-case" scenario conditions since ambient sound levels will be higher in the summer.

- **Comment:** Please clarify the proposed months of operation and any other proposed atmospheric operating restrictions.

Objection: **Asked and answered. UCI has already provided this information to Agency Staff. Agency Staff's request is attempting to unlawfully dictate the design of the project. Testing will occur year-round to simulate real-use scenarios and conditions. In UCI's Second Supplemental Response, UCI stated that "testing is not anticipated to take place" (emphasis added) when temperatures are 41°F with 0% humidity; however testing could occur. Whether or not a test may occur in specific atmospheric conditions is highly dependent on the parameters of the specific experiment to be undertaken. Thus, UCI is unable to provide Agency Staff with any further proposed testing parameters beyond the information already submitted.**

- **Comment**: Additionally, application materials previously stated that there would be a maximum of two shots fired per day fired for a maximum of three consecutive days, with an average of 30 shots per year, and that shots would occur for a period of five years. The UCI Response received December 15, 2023, states that testing was not anticipated to take place at conditions of 41 degrees Fahrenheit and 0% humidity, and that conditions in the first column of Table 1 are typical for the project site during summer months. Please provide the proposed maximum number of firings per week, month, and year of the testing period.

  Objection: Agency Staff's request is attempting to unlawfully design the project. The nature of the testing and design of experiments make it impossible to predict months in advance the exact day, week or month when a shot may be fired. As included in prior submissions, the average number shots in a year will be 30; the anticipated maximum number of shots per month will be 10; firings will not occur on weekends, holidays or between the hours of 4:00pm and 10:00am. UCI will provide neighbors and local officials with a minimum seven (7) day advanced notice of any testing. Any other schedule will prevent UCI from effectively operating the tests to conduct research.

F. **Comment No. 6 (p. 3)**:

- **Comment**: Please revise Image 1 to depict the location of the 100-foot by 100-foot pad, all state land boundaries, the southwest corner of the nearest state land parcel located approximately 300 feet from the northeast corner of the firing pad, the nearest dwellings (including the Pulsifer residence), receptor locations M1 – M4, and the closest point of the proposed gravel pad or the noise source, whichever is closer, to each receptor.

  Objection: Asked and answered. UCI has already supplied Agency Staff with the requested information in Figure 1, "Site Overview Map," provided in H2H's September 2023 Sound Study.

G. **Comment No. 7 (pp. 3-4)**:

- **Comment**: A Norwegian study titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defense Research Establishment (FFI),

and dated 5 December 2007 (the Norwegian study), is the only source of information included in the application providing noise level data from howitzers. This study includes a noise level of 130.5 dB measured at 803 feet from a howitzer. The Revised Noise Analysis appears to use this 130.5 dB measurement from the Norwegian study to calculate a modeled source noise level for an M109 155 mm howitzer of 180.8 dB. The Revised Noise Analysis then uses 180.8 dB to model noise levels at the M5 receptor on State land as 127 dB, and noise levels at the nearest residence as 100 dB. The Noise Analysis then determines that the 3.5-dB difference between the noise level data in the Norwegian Study and the modeled noise levels at the project site show "correlation within ISO standards."

Objection: Asked and answered. Agency Staff is mischaracterizing or misrepresenting data supplied by UCI in prior responses, as well as conflating sound pressure levels measured in dB as falsely equivalent with dB(A). As previously explained, the human ear is not equally sensitive to sounds of all frequencies. Human hearing is much more sensitive to medium pitches (from 500 Hz to 4,000 Hz) than to very low or very high pitches. A tone measuring 80 dB at 500 Hz (medium pitch) sounds louder to humans than a tone measuring 80 dB at 200 HZ (low pitch). To adjust measured sound pressure levels to mimic human hearing response a frequency weighting is applied to measured/calculated sound pressure levels. A-weighting is the standard frequency weighting used in environmental sound assessments. A-weighting attenuates sound with frequencies below 1000 Hz and above 4000 Hz while amplifying sound between 1000 Hz and 4000 Hz where the human ear is most sensitive.

In prior discussions this issue was raised by UCI and explained to Agency Staff. Unfortunately, Agency Staff fails to understand these nuances, nor even the grosser points of sound propagation and energy transfer. Agency Staff stated these issues were irrelevant and to "follow DEC guidelines" which they acknowledged on several occasions they did not understand in the entirety.

Agency Staff is choosing to focus on sound pressure levels without A-weighting which is misleading when referencing measured/calculated sound pressure levels at receptors. Agency Staff has directed UCI to review and provide a noise impact study based upon the DEC's *Program Policy for Assessing and Mitigating Noise Impacts*. According to this policy "noise is likely to be a matter of concern to residents or users of adjacent lands." (*See* p. 2 "II. Background") (Emphasis added.) Only when "a sound level evaluation indicates that receptors may experience sound levels or characteristics that produce significant noise impacts or impairment of property use" will the DEC require mitigation measures. (*See* p. 4, "III. Policy") (Emphasis added.) Crucially, the noise analysis shall be prepared using an A-weighted decibel scale to determine the "environmental effects of sound and human perceptions of sound." (*See* p. 7, "V. Procedure") (Emphasis added.) Thus, analysis of sound pressure levels from the proposed project should be based upon dB(A).

Agency Staff is characterizing noise levels at the M-5 receptor on State Land as 127 dB and 100 dB at the nearest residence. This is incorrect. The modeled impulse sound pressure level at M-5 is 130 dB/107 dB(A). The modeled impulse sound pressure level at State Land classified as Wild Forest, at its relevant corner, is 132 dB and 111 dB(A). With the additional mitigative effects of the Sound Mitigation Bern, the sound pressure level at M-5 is 124 dB / 100 dB(A) and 127 dB / 102 dB(a) at the State Land classified as Wild Forest, at its relevant corner. The closest inhabited structure to the noise source is the Pulsifer residence (R-1), 5,200 feet to the northeast, and has a modeled impulse sound level of 101 dB / 69 dB(A) with the Sound Mitigation Berm.

Crucially, the debate herein between Agency Staff and UCI on estimated impulse sound pressure levels is for a combined noise event that will be less than 7,500 milliseconds (0.45 seconds) in length over a five-year period. *To repeat, the length of time of sound for all anticipated firings combined to occur within a five-year period will be less than 7,500 milliseconds or 7.5 seconds.*

- Comment: Please provide an explanation of these ISO standards and the asserted correlation, including a clarification of whether the ISO standards are appropriately used in this context. Please also provide any other available documentation confirming that 3.5 dB is appropriately cited as the maximum limit of error for this proposal.

  Objection: **Agency Staff is requesting UCI to explain the standards of the International Organization of Standardization (ISO). An applicant's role is not to educate Agency Staff on the scientific or analytical standards Agency Staff is to employ when reviewing an application. With all due respect, it is expected, indeed, imperative that Agency Staff possess the expertise needed when evaluating a project application. Without an understanding of the standardization of the science being utilized and, in turn, reviewed, Agency Staff cannot be relied upon to perform a true, accurate and legitimate review of a project application.**

  Notwithstanding, Agency Staff is directed to page 6 of H2H's September 2023 Sound Study that explains International Standards Organization ISO 9613-1,2,3 standards are applied. UCI also directs Agency Staff to page 13 of the DEC's *Program Policy for Assessing and Mitigating Noise Impacts* concerning thresholds for significant sound pressure level increase. Therein, "increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present." (Emphasis added.) Accordingly, a sound pressure level variance of 3.5 dB has no or minimally appreciable effect on receptors.

- Comment: Please confirm through field-verification at an authorized location and through independent third party verifications that 180.8 dB is the noise level produced by M109 155 mm howitzers.

Objection: Overly burdensome, an untimely request, and seeks immaterial information. For the first time Agency Staff is requesting this test. Based on three years of Agency Staff's disputation of the asserted noise level of M109 155 mm howitzers from a respected scientific study, as well as official US Government materials, and taking into considering the effect atmospheric and environmental conditions have on sound pressure levels, any data provided by UCI from an independent test at a different locale is anticipated to be rejected by Agency Staff. Moreover, the cost to perform such a test is prohibitively high and inappropriate.

- Comment: Please note that NYSDEC's Program Policy 'Assessing and Mitigating Noise Impacts' dated October 6, 2000 last revised February 2, 2001 states that 'In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive.' The approximate noise level of 127 dB does not appear to be in character with the recorded ambient noise level of approximately 37.2 dBA, which per NYSDEC's noise policy, is most similar to wilderness noise levels at approximately 35 dBA.

  Objection: Agency Staff's conclusory comment fails to include or consider impulse noise levels from presently authorized noise sources. In UCI's Response to the First NIPA, UCI noted that impulse noise levels from standard hunting weapons ranges from 160 dB (12-gauge shotgun with an 18.5-inch barrel) to 164 dB (.357 Magnum). Additionally, chainsaws produce continuous noise levels between 105 dB and 120 dB. Naturally occurring lightning strikes and thunder produce an approximate noise level of 120 dB. Thus, the approximate impulse noise level of 127 dB from the proposed tests at State Land classified as Wild Forest, at its relevant corner, is 70-80 dB less than common hunting rifles and only 7 dB louder than a lightning strike (thunder). Agency Staff's current position implies that any impulse noise greater than 35 dB(A) in a wilderness area should not be allowed. If Agency Staff's view was adopted that would result in hunting with firearms being prohibited as an impulse noise source greater than acceptable wilderness ambient noise levels.

H. Comment No. 8 (p. 4):

- Comment: The 'Noise emission data for M109, 155 mm field howitzer' study referenced in the Revised Noise Analysis references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency July 18, 2022 reference the sound level for a M4A2 zone 7 charge. Please confirm that this will be the maximum charge used. Please also explain how the two charges compare and the effect will have on the level of sound produced.

Objection: Agency Staff is attempting to dictate the design of the project. The design Agency Staff seemingly seeks to be implemented is a design in which UCI has no intention of adopting. Agency Staff is also requesting proprietary and sensitive information UCI is not at liberty to release.

I. Comment No. 9 (p. 4):

- **Comment**: Please provide an updated noise analysis that accounts for the confirmed height of the noise source from the gravel pad and the location of the noise source at the closest point of the gravel pad to each receptor. This updated noise analysis must include all tabular, calculated, and conclusory information included in the latest UCI response, Modal Data in Appendix D, and barrier attenuation calculations that account for the most conservative/worst case scenario height and location of the noise source in relation to each receptor. The updated noise analysis must also account for all proposed months of operation and any proposed atmospheric operating restrictions. In addition, the analysis must include revised tabular information, Modal Data in Appendix D, and barrier attenuation calculations that account for the height and location of the noise source in relation to each receptor, and must include sound pressure levels expressed as both dB and dBA. This updated analysis must include a cover sheet with the seal of a NYS licensed professional engineer.

  Objection: This is an unduly burdensome and untimely request which seeks immaterial information. Agency Staff requests new information not before requested although having ample time and opportunities. Furthermore, if UCI were to comply with this request, any new information provided by such revised noise analysis will be nominal or immaterial (*see* responses to Comment 1, *supra*).

CONCLUSION

In summary, UCI has supplied to Agency Staff extensive scientific data supporting a finding that UCI's proposed project (i) will be quieter on surrounding environments than noise generated by the nearby mining operations during blasting, (ii) will create a combined impulse noise event of *7.5 seconds over a five-year period*, and (iii) does not pose a potentially significant environmental impact due to an increase in sound levels in surrounding land, including those designated Wild Forest. Furthermore, if the Agency were to adopt Agency Staff's present opinion that any impulse noise from a ballistic source near Wild Forest land above 35 dB(A) is

impermissible, such position means all hunting firearms, as an impulse noise source greater than the Agency Staff's acceptable wilderness ambient noise level, are also prohibited.

Based upon the foregoing, UCI respectfully requests that the Agency issue a determination finding that: (1) all requests for information contained in the 5th NIPA are duplicative, unnecessary or moot as all information required for the project application to be complete has been submitted by UCI; (2) certain requests for information contained in the 5th NIPA are lacking relevancy or materiality for purposes of completing the application and therefore must be stricken; (3) certain comments contained in the 5th NIPA must be stricken from the administrative record as they are based upon factual errors; (4) certain comments contained in the 5th NIPA must be stricken from the administrative record as they were made by Agency Staff in an unlawful attempt to issue a *de facto* denial of the application; (5) certain comments contained in the 5th NIPA must be stricken from the administrative record as they were made by Agency Staff in an unlawful attempt to alter or change the proposed project or use, contrary to the intentions of UCI or prejudicial to UCI; (6) UCI's project application is complete; and, (7) pursuant to 9 NYCRR §572.22(h), providing notice of the completeness of the application as required by law and thereafter granting the permit application.

Dated: February 29, 2024

Norfolk Beier PLLC

By: _____
Matthew D. Norfolk, Esq.
Authorized Representative

To: Chairman John Ernst
Dan Wilt, Chair – Committee on Regulatory Programs
Barbara Rice, Executive Director
Sarah Reynolds, Esq., General Counsel
David Plant, Deputy Director for Regulatory Programs

ATTACHMENT A

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency

NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No.: 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	n/a

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – shooting range
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Michael Hopmeier:

Thank you for your permit application, received by the Agency on November 19, 2021. The application provided important information on the proposed project. As listed below, initial evaluation by Agency staff indicates that additional information is necessary to review the project and complete the application.

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov and reference Project Number 2021-0276 in the subject line.

A site visit by Agency staff is required before your application can be determined complete. During site visits, staff review the soils and slopes on a project site, as well as any wetlands, waterbodies, and other resources. Please contact Environmental Program Specialist 1 (EPS1) **Fritz Aldinger** to schedule the site visit; the application will remain incomplete until the site visit has occurred.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice of Incomplete Permit Application or the project review process, please contact EPS Aldinger.

December 6, 2021
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. **Item 4 Project Site Location**: Please clarify if the lease area for the commercial use consists of a limited area or the entire tax map parcel. If the lease area is only a portion of the property, please provide a site plan depicting the boundaries of the lease area.

2. **Item 8 Detailed Project Description**:
   - Please provide additional details to describe the commercial use that occurs on Tax Map Parcel 38.1-1-29.000 (The missile silo site) including the frequency of use, hours of operation, number of employees, and number of customers expected.
   - The submission states that the use of a container for catching projectiles is not expected to be necessary. Will the fired projectiles be removed from the site if they are not being retained by a container?
   - Please clarify whether any lead or other potential contaminants may be used in the proposed testing area.
   - Please provide a thorough noise evaluation for all proposed munitions to be fired on site, including an evaluation of the nearest receptors utilizing the NYS DEC's Program Policy for Assessing and Mitigating Noise Impacts. Please provide a noise mitigation plan as necessary.
   - Please provide a design report that complies with the USACE Range Design Guide to confirm the proposed range is adequately sized to ensure safety to human health and the environment and meets all applicable standards for range design.
   - Please provide an unexploded ordnance (UXO) plan.
   - Please clarify what the proposed targets will be for testing and if the targets will be mobile or stationary.
   - Please provide a range decommissioning plan and please clarify the proposed methods for disposing of debris and residues.
   - The proposal indicates that the purpose of the commercial use is to support research for Benet Laboratories, a US Department of Army research and development facility. Please explain why this testing cannot be performed on site at the Watervliet Arsenal, or one of the Army's existing testing facilities or other existing facility with infrastructure already in place.

3. **Item 14 Project Employment and other Benefits:** The submission indicates this proposal will allow for the hiring of more personnel. Please provide details regarding the additional personnel, including the number of employees, if these personnel will be employed full time, if they will be working onsite at Tax Map Parcel 38.1-1-29.000 or 38.1-1-31.000, and the time period of employment.

4. **Item 17 – Site Plan:** Utilizing the US Army Corps of Engineers (USACOE) range design guide, please provide a thorough design plan that includes all design requirements including but not limited to the following:
   - A topographic survey of the entire lease area with firing and target locations and elevations depicted;
   - Siting considerations, including the range support facilities and noise impulse contours from each firing position;
   - Target protect design curves;
   - All proposed signage for safety and other purposes;
   - Proposed berms and walls if applicable;
   - Existing and proposed roads;
   - Parking areas; and
   - Range line of sight.

   Please also identify the surface danger zone (SDZ) per Department of Army's PAM 385-63.

5. **Item 19 Proposed Site Access:** Please clarify if any improvements to the existing logging roads are proposed.

6. **Item 46 Stormwater Management Plan:** Please provide a stormwater plan for the proposed 100-foot by 100-foot area of disturbance and the blasting area.

7. **Item 49 Other Regulatory Permits and Approvals**:
   - Please have the Local Government Notice Form completed, signed by the appropriate town official and submitted to the Agency.
   - Please contact the New York State Department of Environmental Conservation regarding your proposal. Please copy the Agency on all correspondence and provide any comments or other response received.
   - Please contact the NYS Police and US Department of Justice regarding the proposed militarized and/or demilitarized firearms and weapons testing facility. Please copy the Agency on all correspondence and provide any comments or other response received.

Enc: Local Government Notice Form

cc: Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, Landowner

ATTACHMENT B

NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

SECOND NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	n/a

Date Permit Application Received: November 19, 2021
Type of Project: Commercial use shooting range
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Mr. Hopmeier:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on December 22, 2021. The submission provided important information in response to the Agency's December 6, 2021 Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's December 6, 2021 NIPA, the following questions must be addressed in order to review your application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

January 13, 2022
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to frederick.aldinger@apa.ny.gov
All application submissions should be in PDF or similar format and be legible.
Electronic copies of plans must be fully scalable.

1. The provided response to the Agency's December 6, 2021 NIPA indicates the proposed lease area will be a portion of tax map parcel 38.1-1-31, and shows this lease area only as a red rectangle on an unscaled map. Please provide a scaled site plan prepared by a NYS licensed professional showing all of the following:
   - All waterbodies, including permanent and intermittent streams, and all natural swales and drainage features, within 200 feet of proposed development;
   - Boundaries of existing cover types (forested, clearing, etc.);
   - Topographic contours at 2-foot intervals within the leased parcel;
   - Existing and proposed access roadways, trails, and parking areas;
   - All property lines;
   - Proposed construction limits;
   - Safety signage;
   - Proposed control/operations area;
   - Proposed firing pad;
   - Proposed firing range; and
   - Proposed target area.

2. Please confirm the status and use of the road/trail that traverses the northwestern portion of the project site. Do other landowners hold easement or other rights to use this feature?

3. The provided response regarding alternate locations is inadequate. Please provide an explanation as to why the proposed munitions testing cannot be performed outside the Adirondack Park, e.g. at the Watervliet Arsenal, or at one of the Army's existing testing facilities or other existing facility with infrastructure already in place.

4. The provided noise assessment indicates that up to two noise events are to occur per day and are not expected to exceed 185 dBa at the source. However, the noise assessment uses a model with inputs including 183 dBa at the source. In addition, the noise assessment results indicate that an anticipated sound of 82 dBa at the nearest off-site residential receptor dwelling, which is the Pulsifer residence located 1.22 miles away, but provide no discussion with respect to ambient sound levels and characteristics at this receptor location or the sound pressure increase that represents a significant noise effect at this receptor location.

   Please provide a more complete noise assessment report. This report should include a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0 mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Rd and

State Land classified as Wild Forest. The revised assessment report should utilize a noise source of 185 dBa, not 183 dBa, to provide for a worst-case scenario condition, and should provide a detailed evaluation of the potential noise impacts to these receptors with respect to ambient sound pressure level.

5. The provided noise mitigation plan is only a public notification plan provided in narrative comparison to a blasting plan at a local mine with details to be included in the "site security and safety operations plan". Accordingly, please provide the site security and safety operations plan for Agency review. Please also provide a noise mitigation plan that includes sound pressure level reduction methods and accompanies the revised noise assessment report.

6. The provided narrative response states that the US Army Corps of Engineers (USACOE) range design guide is not applicable to a munitions testing range, and that a safety plan cannot be provided, but then states that the applicant will be working closely with the US Army Development Command, which will provide guidance and approval for the range design and operating procedures prior to allowing operations to occur. As such, to allow the Agency to provide for a coordinated review, please copy this Agency on the range design and operating procedures application to the US Army Development Command, and copy this Agency on any comments, approvals and/or correspondence received.

7. Please provide the Agency with a copy of all correspondence submitted to the New York State Department of Environmental Conservation (NYSDEC) regarding your proposal. Please also submit any response or other correspondence received from the NYSDEC. Please note that submission of an application to the NYSDEC or written confirmation from the NYSDEC documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

8. The "Explosive License- Dealer Manufacture" submitted to the Agency on December 22, 2021, expired in September 2021. Please provide confirmation from the New York State Police and United States Department of Justice (DOJ) that all approvals have been received for your proposal. Alternatively, please copy the Agency on an application to the State Police and DOJ for all necessary approvals. Please note that submission of application to the State Police and DOJ or written confirmation from these agencies documenting that no approval is necessary will be required to allow for coordinated review of your proposal.

cc: Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

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ATTACHMENT C

NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

March 1, 2022

Michael Hopmeier
620 Herndon Parkway, Suite 120A
Herndon, VA 20170

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Michael Hopmeier:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received on February 11, 2022. The submission provided important information in response to the Agency's January 13, 2022 Notice of Incomplete Permit Application (NIPA). As a result, items 2, 3, and 7 of the January 13, 2022 NIPA are either satisfied or no longer required.

As discussed during the February 25, 2022 WebEx meeting, the remaining information required by the Agency's January 13, 2022 NIPA is still required to review the application. A copy is enclosed for your convenience. You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

If you have any questions regarding this letter or the project review process, please contact me at (518) 304-6149.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

Attachment: January 13, 2022 NIPA

ATTACHMENT D

NEW YORK STATE OF OPPORTUNITY. | Adirondack Park Agency

THIRD NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on May 12, 2022. The submission provided important information in response to the Agency's January 13, 2033 Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's December 6, 2021 and January 13, 2022 NIPAs, the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the NIPAs was not submitted and is required to review the application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

June 6, 2022
Date

/s/ John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3)

Attachment: List of Requested Information

Cc: Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to Frederick.aldinger@apa.ny.gov All application submissions should be in PDF or similar format and be legible. Electronic copies of plans must be fully scalable.

1. **January 13, 2022 NIPA Item 1:** The submitted site plan titled, "Map of Survey Showing Certain Features of Lands of Pulsifer Logging LLC to be leased to "Diversified Upstate Enterprises LLC," prepared by John Deming, PLS and dated April 14, 2022, does not indicate the proposed boundaries of the lot to be leased and does not indicate the proposed size, just a cleared area labeled as "Shooting Range". Utilizing the scale provided within the PDF, the cleared area as measured along the limits of clearing is approximately 2.75 acres in size. Please confirm whether this is the proposed lease area size. In addition, an "edited copy of certified map" was provided that indicates a purple oval, not labeled, a yellow box labeled as "firing pad", and a green box labeled as "target area." Utilizing the scale provided with the PDF, the yellow box labeled "firing pad" is approximately 38 feet by 60 feet and the target area is located approximately 571 feet away and is approximately 52 feet by 61 feet in size. The original application materials indicated that the firing pad was to be constructed of a 100-foot by 100-foot crushed stone pad. Please clarify if the proposal has been revised to reduce the lease area and firing pad area with no crushed stone imported to the site. Please clarify and revise the professionally prepared site plan map to indicate the lease area boundaries, the location of any proposed safety signage, and the size and the location and dimensions of the firing pad and target area accordingly. In addition, please clarify what the purple oval represents.

   In addition, the site plan indicates that the proposed lease is to Diversified Upstate Enterprises, LLC. The application and prior responses have come from Michael Hopmeier and Unconventional Concepts, Inc. Please clarify the relationship between Diversified Upstate Enterprises and Unconventional Concepts Inc. and provide signatures from the principals involved with Diversified Upstate Enterprises, LLC as necessary.

2. **January 13, 2022 NIPA Item 4**: Noise assessment details included in the submission received May 12, 2022 conflict with what was previously submitted and further clarification is necessary. For instance, the provided response materials state that "(B)ased on recommendation from the APA, further research on the noise source was performed. Based on that research, the actual noise source is assumed to be 166.1 dB." The provided response materials do not clarify how this revised noise source estimate of 166.1 dB was determined, how the previously presented noise source of 185 dB was in error, or, for example, whether a different cannon or munition is being proposed to be tested resulting in different source noise levels. Absent a detailed explanation regarding this significant reduction of 19 dB in noise source, the provided noise assessment is unsupported. Most notably, the provided noise assessment indicates that the equipment being tested is a M109A5/6; Paladin, 155mm self-propelled Howitzer firing M4A2 zone 7 charges, however the provided footnote reference to a link of a PDF of 2006 Noise Levels of Common Army Equipment by USACHHPM indicates that the location of the 166.1 dB noise measurement is from "in fighting compartment with hatches open except drivers," which is not

representative of a worst case scenario of a maximum noise intensity emitted open air with no armored tank walls or other sound mitigation barriers in place. Please address these discrepancies.

The materials received May 12, 2022 do not adequately address the January 13, 2022 NIPA Item 4 with respect to providing a more complete noise assessment report, including a scaled site plan that clearly identifies all potential adjacent and nearby noise receptors within a minimum 2.0 mile radius from the munition firing noise source of 185 dBa as measured from the adjacent property lines as a conservative measure. This should include the residences along Pulsifer Road and State Land classified as Wild Forest.

The provided noise assessment only evaluates the nearest off-site residential receptor dwelling as the Pulsifer residence near the sawmill, but this submission indicates that the dwelling is located 0.96 miles east of the noise source, where the previous submission materials indicated that it's located 1.22 miles from the source. Please clarify whether the firing pad location has changed and provide an accompanying street address for this nearest receptor. Please also provide the distance of the noise receptor from the existing enclosed sawmill and include an estimate of vegetated buffer from the sawmill to this receptor and any other nearby receptors of the sawmill as further discussed below.

The provided noise assessment indicates that "the estimated background/ambient noise level during the day at the proposed test site is 80 dB(A)," but also indicates that the proposed firing pad is to be located approximately 1 mile (0.96 mi) from the sawmill as detailed above. Please reconcile. The provided noise assessment indicates that the estimated background/ambient noise level during the day at the nearest receptor of the Pulsifer Residence is also 80 dBa. Please note that the referenced commercial use site is subject to Agency Permit 1991-0170, which authorized the expansion of an existing sawmill and wood using facility. As described in project description 6h and project impact 17a of 1991-0170, the facility design was intended to control and reduce noise, including concrete block/sand fitted walls, roofed structure with hanging commercial noise absorbing baffles for the debarker, with bark blown directly into a closed box trailer; full enclosure of the main sawmill with a semi-permanent solid wall on the east end removed only for equipment installation and repair; sawdust will be blown directly into a closed box trailer; chipper installed inside a concrete block, roofed structure with chips blown directly into a closed box trailer; dowel mill machinery to be fully enclosed in mill building with baffles and log barriers used to reduce noise. Without accounting for the noise mitigation measures in place at the enclosed sawmill, in addition to the distance from the residential dwelling to the enclosed sawmill, and absent noise meter readings, the estimated ambient noise level of 80 dBa is unsupported.

Please clarify whether there are tanks or other armored machinery now proposed to be utilized on-site and provide and evaluate the corresponding sound pressure levels in a revised noise assessment.

The noise assessment materials received by the Agency on May 12, 2022, appear to be prepared by Unconventional Concepts, Inc. and do not include a professional stamp on the submission materials. The preparer of any revisions submitted to address the items above must be a NYS licensed professional familiar with NYSDEC's Program policy Assessing and Mitigating Noise Impacts (ny.gov).

3. **January 13, 2022 NIPA Item 5**: The provided response states that no additional sound pressure level reduction methods are proposed. Based on the information provided regarding potential sound impacts, this is inadequate. As detailed in NYSDEC's noise policy, the addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65dB(A). As the provided ambient noise level of 80 dBa is unsupported and needs to be revised per NYSDEC's noise policy, please provide an accompanying noise mitigation plan that includes sound pressure level reduction methods and also addresses the following:

   - The materials indicate that for personnel within proximity to the site, hearing protection will be provided. Please specify what this minimum specific hearing protection safety distance is from the firing pad location.
   - The materials indicate the Town Supervisor of the Town of Lewis will coordinate with local Emergency Management Services to notify any citizens in close proximity to the test range of the test schedule, by phone or e-mail, 72 hours prior to the testing and again 24 hours prior to testing. Please provide documentation of the agreement with the Town of Lewis that they are responsible for notification. Additionally, please define "close proximity" to the test range.

Please note that, based upon the application materials submitted to date, the proposal as presented consists of testing munitions year-round up to 120 times per year with an estimated munitions firing noise source of 185 dB with no noise source mitigation measures proposed. The U.S. Department of the Army considers any impulse noise greater than 140 dB hazardous and requires their employees to wear hearing protection. In addition, the US Bureau of Mining research has documented damage to residential dwelling window glass from over air pressure blasts of greater than 133 dB with the federal standard 30 CFR § 816.67 set at 133 dB on over air blasts associated with mining activities. Accordingly, based on potential noise impacts alone, absent revisions to the project proposal, the project does not meet the criteria for issuance of a permit under Agency law.

February 2023 Sound Study

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SOUND STUDY

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: March 1, 2023

UNCONVENTIONAL CONCEPTS, INC.

APA PROJECT #2021-0276

Prepared for:
Unconventional Concepts, Inc.
620 Herndon Parkway, Suite 120A
Herndon, VA 20170

Prepared by:

H2H Geoscience Engineering, PLLC
179 River Street
Troy, New York 12180
(518) 270-1620
www.h2hg-e.com

February 2023

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1.0 INTRODUCTION

Unconventional Concepts, Inc. (UCI) has proposed to the Adirondack Park Agency (APA), an application for the operation of a projectile testing range in Lewis, New York. The range (Site) is at 195 Hale Hill Lane (Figure 1). H2H Geoscience Engineering, PLLC (H2H) prepared this report to identify and evaluate the potential impacts of off-site sound propagation from the proposed application. The potential sound impacts associated with the application were assessed in accordance with the requirements set forth by the Adirondack Park Agency (APA) and the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT BACKGROUND

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. The range will be developed to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance.

This effort will focus on the test and evaluation of these new systems in support of a critical US Army research program managed by Benét Laboratories at Watervliet Arsenal in Albany, NY. The project will focus on the instrumentation and firing of these systems in a constrained area to allow for measurement and assessment of the internal ballistics and kinetic and kinematic effects of these modern designs.

All test equipment and instrumentation will be portable; equipment will be deployed as needed to the Site for a test and will then be completely removed at the end of the test. No more than three tests per month are anticipated. Each test will consist of four-five shots, and each series of shots will last no more than two days. Testing will only occur on weekdays, between 10:00 AM and 4:00 PM local time. No more than two shots will be fired in one day. These tests are anticipated to continue for a period of 5 years, with an average of no more than 30 shots per year.

The Site is on land owned by Pulsifer Logging, LLC (38.1-1-31.000). UCI is using the land with the landowner's (written) permission. The Sound Source (system being tested) will be located on a 100 ft. X 100 ft. crushed gravel pad (Firing Pad). The Operations Control Area is adjacent to the Firing Pad; the Target Area is 590 ft. east of the Firing Pad (Figure 2).

The Site is accessed via an access road off Hale Hill Road. The area surrounding the Site is heavily forested with a topographic high to the east and south. NYS Route 9 is located approximately 7,000 ft. to the east. Within a two-mile radius of the site (Project Area) forty-two Residential Receptors (RR) were identified. The closest RR is the Pulsifer residents (R-1) 5,200 ft. to the northeast off Hale Hill Road. Five parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius (Figure 1).

H2H developed a Scope of Work (SOW) approved by the APA specifying the locations sound level monitoring was conducted. The SOW incorporating the APA's November 28, 2022 comments on the location of Monitoring location M-3 and M-4 is attached as Appendix E.

3.0 SOUND LEVEL MONITORING

Sound level monitoring was conducted by H2H on December 20, 2022, and December 21, 2022. Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Site to best determine ambient sound level conditions in the Project Area (Figure 1).

3.1 ENVIRONMENTAL CONDITIONS

Weather data was collected from a weather station located at The Silo (Figure 1).

3.1.1 December 20, 2022

During the study period, the weather conditions included temperatures between 27 °F and 31 °F, winds out of the south between zero and six miles per hour, 70% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.1.2 December 21, 2022

During the study period, the weather conditions included temperatures between 23 °F and 32 °F, winds out of the southwest between zero and four miles per hour, 75% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.2 MONITORING EQUIPMENT

Sound level measurements were recorded using calibrated Casella CEL-633 ANSI or Quest SoundPro DL-2-1/3 sound level meters. Each monitor was set to log A-weighted, fast response, at one-second intervals. Each Casella monitor was programed to record audio to aid in identifying sound sources. Each unit was field calibrated before each monitoring event; each unit was also laboratory-qualified, technician calibrated (Appendix B). Each meter was tripod mounted at an approximate height of 5 feet, microphones were covered with windscreens. Monitors were outfitted with external batteries.

3.3 MONITORING LOCATION SOUND LEVELS

Sound levels were collected as discussed in Section 3.2 at each monitoring location during 10:00 a.m. – 4:00 p.m. (proposed testing hours). Sound level data was cleaned to remove anomalous sound sources, and data outside monitoring periods. Staffed sound level monitoring was conducted at each monitoring location to log the relative loudness, and the types of sounds that could be heard at each monitoring location. Photos of each monitoring location are provided in appendix B.

3.3.1 Monitoring Location M-1 –

Monitoring location M-1 is adjacent to Residential Receptor R-1 on Hale Hill Road at elevation 705 ft. amsl. 5,800 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-1 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-1 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Heavy truck traffic on Hale Hill Rd. to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –

- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 81.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 56.7 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Heavy truck traffic to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –

- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 27.5 to 83.0 dBA.
- The average equivalent continuous sound level (L_{eq}) was 57.2 dBA

3.3.2 Monitoring Location M-2 -

Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surrounding Pulsifer Rd.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 24.8 to 70.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 42.5 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –
- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 25.0 to 70.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.8 dBA

3.3.3 Monitoring Location M-3

Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9,

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.2 to 82.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 59.6 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9,

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 86.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 61.2 dBA

3.3.4 Monitoring Location M-4

Monitoring Location M-4 is southwest of the Firing Pad next to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 18.1 to 70.7 dBA.
- The average equivalent continuous sound level (L_{eq}) was 39.1 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.5 to 71.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.9 dBA.

3.3.5 Monitoring Location M-5

Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and

- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.6 to 65.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 37.2 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.8 to 58.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 34.7 dBA.

4.0 MODEL RESULTS

4.1 SOUND PROROGATION MODEL

A sound propagation model was developed for the area within a two-mile radius of the Firing Pad using the International Standards Organization ISO 9613 -1,2,3 standards applied in the dBmap.net noise mapping tool. The model accounts for surface reflection and absorption, atmospheric absorption, geometric divergence, weather conditions, topography, and source sound power level.

The model assumes moderate downwind propagation, and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and Sound Source height of 6.5 feet is used. Appendix D summaries model input data.

The Sound Source being modeled is a field howitzer of the type M109A3GN (155mm). This field howitzer model is typical for its type and would represent the noisiest field howitzer tested on Site. The sound level data for the Sound Source is provided in a study conducted by the Norwegian Defense Estates Agency (Appendix E). Sound Levels were measured at 820 ft. from the muzzle of the howitzer in the direction of fire. Sound levels used for the Sound Source are from Sensor 1, (closest to direction of fire) sound levels are shown in Table E.2 of Appendix E. The modeled scenario shows the M109A3GN firing from the Firing Pad (only location Sound Source will be operated) as shown on Figure 2.

The sound propagation model shows the modeled impulse sound level produced by the Sound Source; the duration of the impulse sound level is approximately 4 milliseconds. Model results are shown in Figure 3. Sound levels are A-weighted and shown in the form of isolines in 5 dB intervals from 45 dB(A) to 130 dB(A). Modeled sound levels at each monitoring location are labeled.

4.2 EFFECT ON AMBIENT SOUND LEVELS

To measure the effect the modeled impulse sound (shot fired from the howitzer) would have on ambient sound levels within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. The $L_{eq,\ 1\text{-}sec}$ recorded sound levels were exported to allow each $L_{eq,\ 1\text{-}sec}$ sound level over the monitoring period (10:00

a.m. to 4:00 p.m.) to be viewed individually. To measure how impulse sound levels would affect the ambient sound level at each monitoring location the modeled impulse sound level (Figure 3) at each monitoring location is input into the ambient data for that monitoring location. This was done twice to model the effect of two impulse sound levels (two shots per day). The results of each modeled scenario are compared to the recorded ambient sound levels in Table 1a (12/20/2022 ambient sound levels) and Table 1b (12/21/2022 ambient sound levels).

Table 1a: Tuesday, December 20, 2022, Modeled Sound Level Summary Table

Tuesday, December 20, 2022				
Monitoring Location	**Recorded Ambient dBA Leq**	**Modeled Impulse sound level dBA**	**Modeled Ambient dBA Leq**	**Change from Recorded Ambient**
M-1	57.2	75	57.2	0
M-2	42.5	71	42.8	0.3
M-3	59.6	73	59.6	0
M-4	39.1	79	41.9	2.8
M-5	37.2	107	66.7	29.5

Table 1b: Wednesday, December 21, 2022, Modeled Sound Level Summary Table

Wednesday, December 21, 2022				
Monitoring Location	**Recorded Ambient dBA Leq**	**Modeled Impulse sound level dBA**	**Modeled Ambient dBA Leq**	**Change from Recorded Ambient**
M-1	56.7	75	56.8	0.1
M-2	40.8	71	41.2	0.4
M-3	61.2	73	61.2	0
M-4	40.9	79	42.9	2.0
M-5	34.7	107	66.7	32.0

5.0 SUMMARY & CONCLUSIONS

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. Testing will only occur on weekdays, between the hours of 10:00 a.m. and 4:00 p.m. No more than two shots will be fired in one day. Forty- two residential receptors, and five parcels of NYS Land identified as Wild Forest fall within the Project Area (Figure 1). Sound level monitoring was conducted at five monitoring locations on December 20, 2022, and December 21, 2022, to determine ambient sound levels within the Project Area.

A sound propagation model was developed to evaluate the impulse sound level produced by the Sound Source within the Project Area (Figure 3). The effect of the modeled impulse sound level on ambient sound levels from each monitoring location is discussed in Section 4.2 and summarized in Table 1.

The modeled change in ambient sound level is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors. No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-43) adjacent to the Firing Pad (Figure 2 & 3) shows a modeled impulse sound level of 107 dB(A), and a modeled ambient sound level of 66.7 dB(A) a 32.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

There are no identified public trails on or means of public access to R-43. In reviewing surrounding land uses three currently permitted hard rock mining operations exist within a 2.1-mile radius of the Site. Hard rock mining operations require regular blasting as part of their weekly operations, under the mines NYSDEC Mine Land Reclamation Permit an air blast limit of 133 dB measured to the closest structure outside the permit area is permitted. 133 dB is 26 dB above the modeled sound level of 107 dB(A) at R-43. In addition, one of the currently permitted mining operations is adjacent to lands classified as Wilderness. Lands classified as Wilderness are considered to be less impacted by human use than lands classified as State Forest.

Based on the information presented in this report the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area.

FIGURES

800

FIGURE 1 –SITE OVERVIEW MAP

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FIGURE 1 - SOUND PROPAGATION MAP

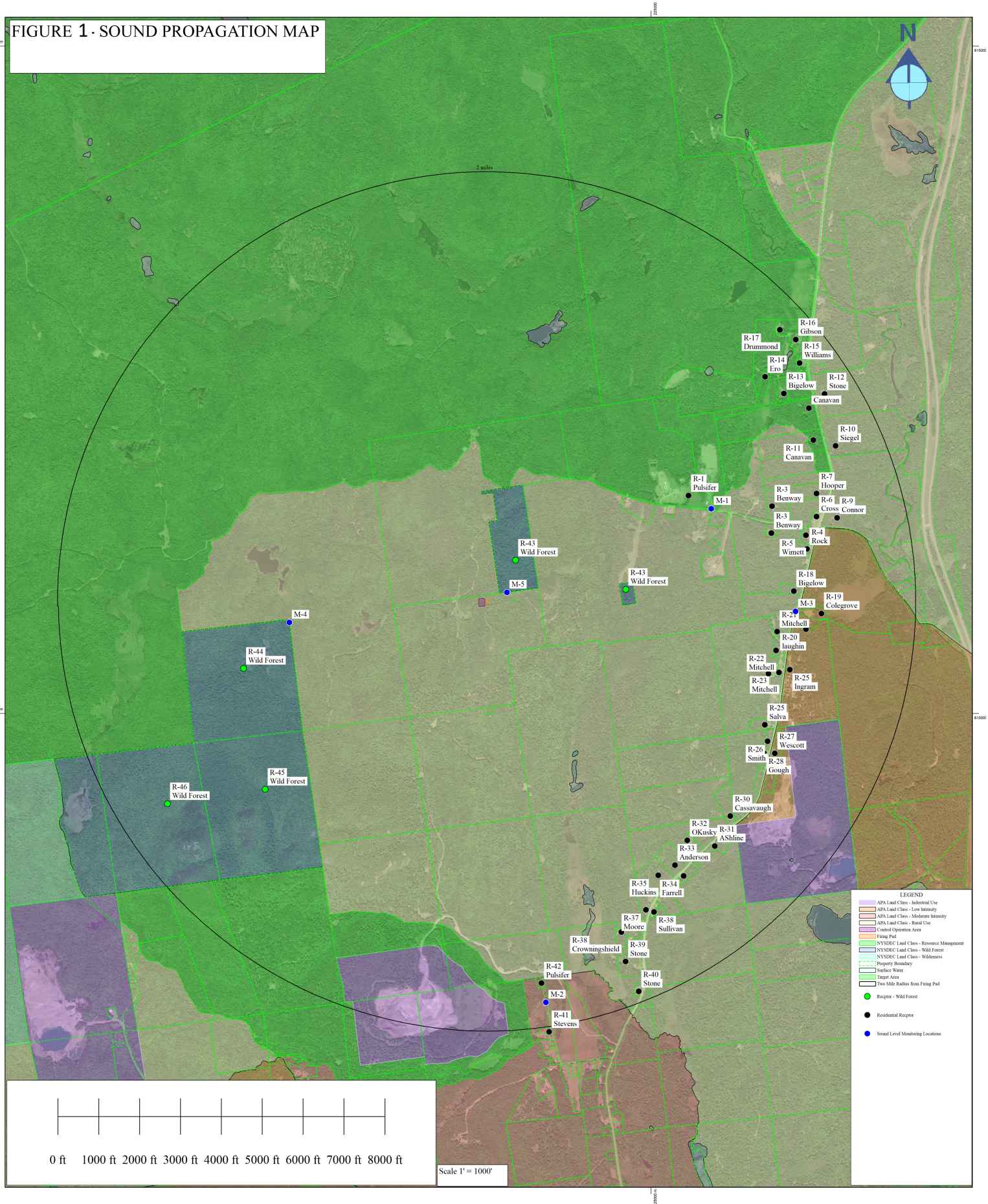

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FIGURE 2 – SITE MAP

803

FIGURE - 2 SITE MAP

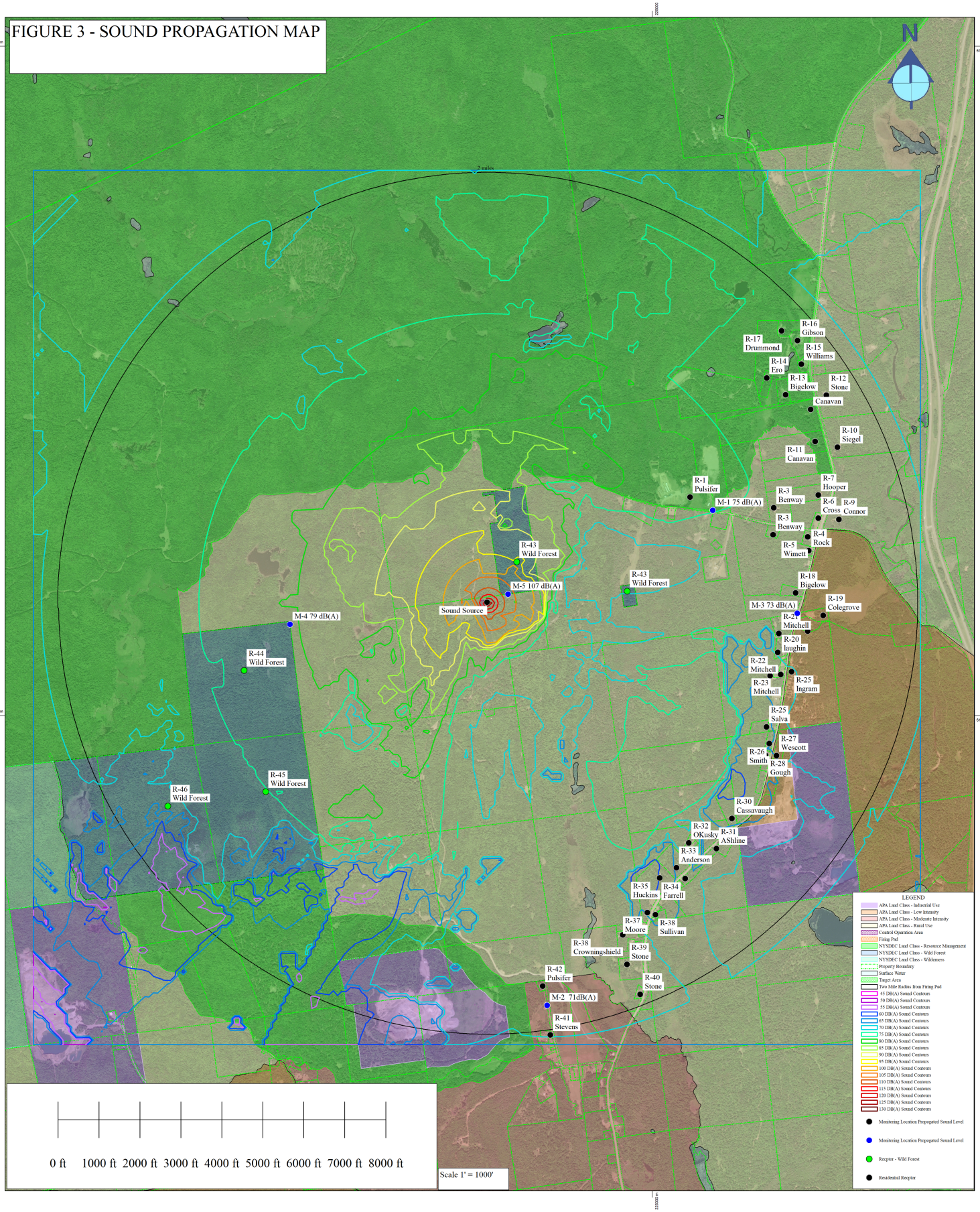


804

804

FIGURE 3 – SOUND PROPAGATION MAP

FIGURE 3 - SOUND PROPAGATION MAP



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APPENDICES

APPENDIX A –
NYSDEC – ASSESSING AND MITIGATING NOISE IMPACTS

Assessing and Mitigating Noise Impacts

New York State
Department of Environmental Conservation

PROGRAM POLICY	**Department ID: DEP-00-1**	**Program ID: n/a**
Issuing Authority: Environmental Conservation Law Articles 3, 8, 23, 27 Name: Jeffrey Sama Title: Director Signature: /S/ Date: 10/6/00 Issuance Date: October 6, 2000 Revised: February 2, 2001	**Originating Unit: Division of Environmental Permits** Office/Division: Environmental Permits Unit: Phone: (518) 402-9167 Latest Review Date (Office Use):	

Abstract: Facility operations regulated by the Department of Environmental Conservation located in close proximity to other land uses can produce sound that creates significant noise impacts for proximal sound receptors. This policy and guidance presents noise impact assessment methods, examines the circumstances under which sound creates significant noise impacts, and identifies avoidance and mitigative measures to reduce or eliminate noise impacts.

Related References: See references pages 27 and 28.

I. PURPOSE[1]

This policy is intended to provide direction to the staff of the Department of Environmental Conservation for the evaluation of sound levels and characteristics (such as pitch and duration) generated from proposed or existing facilities. This guidance also serves to identify when noise levels may cause a significant environmental impact and gives methods for noise impact assessment, avoidance, and reduction measures. These methods can serve as a reference to applicants preparing environmental assessments in support of an application for a permit. Additionally, this guidance explains the Department's regulatory authority for undertaking noise evaluations and for imposing conditions for noise mitigation measures in the agency's approval

[1] A Program Policy Memorandum is designed to provide guidance and clarify program issues for Division staff to ensure compliance with statutory and regulatory requirements. It provides assistance to New York State Department of Environmental Conservation (DEC) staff and the regulated community in interpreting and applying regulations and statutes to assure that program uniformity is attained throughout the State. Nothing set forth in a Program Policy Memorandum prevents DEC staff from varying from that guidance as specific circumstances may dictate, provided the staff's actions comply with applicable statutory and regulatory requirements. As this guidance document is not a fixed rule, it does not create any enforceable right by any party using the Program Policy Memorandum.

of permits for various types of facilities pursuant to regulatory program regulations and the State Environmental Quality Review Act (SEQR).

II. BACKGROUND

Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by proposed or existing facilities may become noise due to land use surrounding the facility. When lands adjoining an existing or proposed facility contain residential, commercial, institutional or recreational uses that are proximal to the facility, noise is likely to be a matter of concern to residents or users of adjacent lands.

A. Sources of Noise Generation

The three major categories of noise sources associated with facilities are (1) fixed equipment or process operations; (2) mobile equipment or process operations; and (3) transport movements of products, raw material or waste. The fixed plant may include a very wide range of equipment including: generators; pumps; compressors; crushers of plastics, stone or metal; grinders; screens; conveyers; storage bins; or electrical equipment. Mobile operations may include: drilling; haulage; pug mills; mobile treatment units; and service operations. Transport movements may include truck traffic within the operation, loading and unloading trucks and movement in and out of the facility. Any or all of these activities may be in operation at any one time. Singular or multiple effects of sound generation from these operations may constitute a potential source of noise.

B. Potential for Adverse Impacts

Numerous environmental factors determine the level or perceptibility of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; time of day; wind direction; temperature gradient; and relative humidity. The characteristics of a sound are also

important determining factors for considering it as noise. The amplitude (loudness), frequency (pitch), impulse patterns and duration of sound all affect the potential for a sound to be a noise. The combination of sound characteristics, environmental factors and the physical and mental sensitivity of a receptor to a sound determine whether or not a sound will be perceived as a noise. This guidance uses these factors in assessing the presence of noise and the significance of its impacts. It relies upon qualitative and quantitative sound evaluation techniques and sound pressure level impact modeling presented in accepted references on the subject.

C. Mitigation

Mitigation refers to actions that will be taken to reduce the effects of noise or the noise levels on a receptor. Adverse noise effects generated by a facility can be avoided or reduced at the point of generation thereby diminishing the effects of the noise at the point of reception. This guidance identifies various mitigation techniques and their proper application either at the source of noise generation or on a facility's property. Alternative construction or operational methods, equipment maintenance, selection of alternative equipment, physical barriers, siting of activities, set backs, and established hours of construction or operation, are among the techniques that can successfully avoid or reduce adverse noise effects.

D. Decision Making

When an assessment of the potential for adverse noise impacts indicates the need for noise mitigation, it is preferred that specifications for such measures be incorporated in a noise analysis and in the applicant's work or operational plan necessary for a complete application. Presenting a plan that incorporates effective noise mitigation provisions facilitates the Department's technical and environmental review and minimizes or negates the imposition of permit conditions by the Department. Adherence to these plans becomes a condition of a permit.

Noise avoidance and mitigation measures may also be imposed directly as conditions of permit issuance. This guidance will review the statutory authority under which the Department can require the mitigation of noise effects.

III. POLICY

In the review of an application for a permit, the Department of Environmental Conservation is to evaluate the potential for adverse impacts of sound generated and emanating to receptors outside of the facility or property. When a sound level evaluation indicates that receptors may experience sound levels or characteristics that produce significant noise impacts or impairment of property use, the Department is to require the permittee or applicant to employ reasonable and necessary measures to either eliminate or mitigate adverse noise effects. Options to be used to fulfill this guidance should be implemented within the existing regulatory and environmental review framework of the agency.

Regulatory authority for assessing and controlling noise effects are contained in both SEQR and specific Department program regulations. Specific regulatory references are as follows:

Section 3-0301(1)(i) of the Environmental Conservation Law (ECL) states that the commissioner shall have the power to: "i. Provide for prevention and abatement of all water, land and air pollution including but not limited to that related to particulates, gases, dust, vapors, noise, radiation, odor, nutrients and heated liquids."

To comply with Article 8 of the ECL and 6 NYCRR Part 617, State Environmental Quality Review Act, consideration of all relevant environmental issues must be undertaken in making a determination of environmental significance. Noise impact potential is one of many potential issues for consideration in a SEQR review.

Environmental Conservation Law (ECL) Article 23, Title 27, Mined Land Reclamation Law (MLRL), requires applicants for permits to prepare and submit a mined land use plan to the Department for approval. The plan must describe, "the applicant's mining method and measures

to be taken to minimize adverse environmental impacts resulting from the mining operation." The provisions to be incorporated in a Mined Land Use Plan, as specified in 6 NYCRR Section 422.2, include the control of noise as a component of the plan.

The solid waste regulations at 6 NYCRR Subdivision 360-1.14(p), establish A-weighted decibel levels that are not to be exceeded at the property line of a facility.

The Division of Air Resources has regulations in 6 NYCRR Parts 450 through 454 that regulate the allowable sound level limits on certain motor vehicles. The statutory authority for these regulations is found in the New York State Vehicle and Traffic Law, Article 10, Section 386.

This guidance does not supercede any local noise ordinances or regulations.

IV. RESPONSIBILITY

The environmental analyst, acting as project manager for the review of applications for permits or permit modifications and working in concert with the program specialist, is responsible for ensuring that sound generation and noise emanating from proposed or existing facilities are properly evaluated. For new permits or significantly modified permits, there should be a determination as to the potential for noise impacts, and establishment of the requirements for noise impact assessment to be included in the application for permit. Where the Department is lead agency, the analyst is responsible for making a determination of significance pursuant to SEQR with respect to potential noise impacts and include documentation for such determination.

Where impacts are to be avoided or reduced through mitigation measures, the analyst, or where there are program requirements to address noise, the program specialist, should determine the effectiveness and feasibility of those measures and ensure that the permit conditions contain specific details for such measures. It should also be determined if additional measures to control noise are to be imposed as a condition of permitting. Appropriate permit language for the permit conditions should be developed by the program specialist and the analyst. The results of noise impact evaluations and the effectiveness of mitigation measures

shall be incorporated into SEQR documents and, where necessary, permit conditions shall be placed in final permits to ensure effective noise control.

When it is determined that potential noise effects, as well as other issues, warrant evaluation of impacts and mitigation measures in a Draft Environmental Impact Statement (EIS) prepared pursuant to SEQR, the environmental analyst with the Division of Environmental Permits assumes responsibility for determining the level of evaluation needed to assess sound level generation, noise effects, and mitigation needs and feasibility.

For existing facilities, the program specialist will determine the need for additional mitigation measures to control noise effects either in response to complaints or other changes in circumstances such as new noise from existing facilities or a change in land-use proximal to the facility.

The applicant or their agent, in preparing an application for a permit and supporting documentation, is responsible for assessing the potential noise impacts on area receptors. When potential adverse noise impacts are identified, the applicant should incorporate noise avoidance and reduction measures in the construction or operating plans. The applicant's submittal should also assess the effectiveness of proposed mitigation measures in eliminating adverse noise reception. Where noise effects are determined to be a reason in support of a SEQR positive declaration, the applicant shall assess noise impacts, avoidance, and mitigation measures in a Draft EIS using methodologies acceptable to this Department.

V. PROCEDURE

The intent of this section is to: introduce terms related to noise analyses; describe some of the various methods used to determine the impacts of sound pressure levels on receptors; identify some of the various attenuators of noise; and list some of the mitigative techniques that can be used to reduce the effects of noise on a receptor. At the end of the section three levels of analysis are described. The first level determines the potential for adverse noise impacts based on noise characteristics and sound pressure increases solely on noise attenuation over distance between the source and receptor of the noise. The second level factors other considerations such as topography and noise abatement measures in determining if adverse

noise impacts will occur. The third level evaluates noise abatement alternatives and their effectiveness in avoiding or reducing noise impacts.

The environmental effects of sound and human perceptions of sound can be described in terms of four characteristics:

1. Sound Pressure Level (SPL may also be designated by the symbol L_p) or perceived loudness is expressed in decibels (dB) or A-weighted decibel scale dB(A) which is weighted towards those portions of the frequency spectrum, between 20 and 20,000 Hertz, to which the human ear is most sensitive. Both measure sound pressure in the atmosphere.

2. Frequency (perceived as pitch), the rate at which a sound source vibrates or makes the air vibrate.

3. Duration i.e., recurring fluctuation in sound pressure or tone at an interval; sharp or startling noise at recurring interval; the temporal nature (continuous vs. intermittent) of sound.

4. Pure tone which is comprised of a single frequency. Pure tones are relatively rare in nature but, if they do occur, they can be extremely annoying.

Another term, related to the average of the sound energy over time, is the Equivalent Sound Level or $L_{eq.}$ The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent Sound Level is considered to be directly related to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time. By its derivation L_{eq} does not express the maximum nor minimum SPLs that may occur in a given time period. These maximum and minimum SPLs should be given in the noise analysis. The time interval over which the L_{eq} is measured should always be given. It is generally shown as a parenthetic; $L_{eq\,(8)}$ would indicate that the sound had been measured for a period of eight hours.

Equivalent Sound Level (L_{eq}) correlates well and can be combined with other types of noise analyses such as Composite Noise Rating, Community Noise Equivalent Level and day-night noise levels characterized by L_{dn} where an $L_{eq(24)}$ is measured and 10 dBA is added to all noise levels measured between 10 pm and 7 am. These different types of noise analyses

basically combine noise measurements into measures of cumulative noise exposure and may weight noise occurring at different times by adding decibels to the actual decibel level. Some of these analyses require more complex noise analysis than is mentioned in this guidance. They may be used in a noise analyses prepared for projects.

Designations for sound levels may also be shown as $L_{(10)}$ or $L_{(90)}$ in a noise analysis. These designations refer to the sound pressure level (SPL) that is exceeded for 10% of the time over which the sound is measured, in the case of $L_{(10)}$, and 90% of the time, in the case of $L_{(90)}$. For example, an $L_{(90)}$ of 70 dB(A) means that 70 dB(A) is exceeded for 90% the time for which the measurement was taken.

A. Environmental Setting and Effects on Noise Levels

1. Sound Level Reduction Over Distance - It is important to have an understanding of the way noise decreases with distance. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, SPL changes in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dB reduction in the sound. Therefore, a sound level of 70 dB at 50 feet would have a sound level of approximately 64 dB at 100 feet. At 200 feet sound from the same source would be perceived at a level of approximately 58 dB.

2. Additive Effects of Multiple Sound Sources - The total sound pressure created by multiple sound sources does not create a mathematical additive effect. Below Table A is given to assist you in calculating combined noise sources. For instance, two proximal noise sources that are 70 dBA each do not have a combined noise level of 140 dBA. In this case the combined noise level is 73 dBA. Since the difference between the two sound levels is 0 dB, Table A tells us to add 3 dB to the sound level to compensate for the additive effects of the sound. To find the cumulative SPL assess the SPLs starting with the two lowest readings and work up to the difference between the two highest readings. For several pieces of equipment, operating at one

time, calculate the difference first between the two lowest SPLs, check Table A and add the appropriate number of decibels to the higher of the two sound levels. Next, take the sound level that was calculated using Table A and subtract the next lowest sound level to be considered for the operation. Consult Table A again for the additive effect and add this to the higher of the two sound levels. Follow this process until all the sound levels are accounted for. As an example, let us say that an area for a new facility is being cleared. The equipment to be used is: two chainsaws, one operating at 57 dBA and one at 60 dBA; a front end loader at 80 dBA; and a truck at 78 dBA. Start with the two lowest sound levels: 60 dBA - 57 dBA = 3 dBA difference. Consulting the chart add 2 dBA to the higher sound level. The cumulative SPL of the two chainsaws is 62 dBA. Next, subtract 62 dBA from 78 dBA. 78 dBA - 62 dBA = 16 dBA. In this case, 0 dBA is added to the higher level so we end up with 78 dBA. Lastly, subtract 78 dBA from the 80 dBA. 80 dBA - 78 dBA = 2 dBA a difference of 2 dBA adds 2 dBA to the higher SPL or 82 dBA. The SPL from these four pieces of equipment operating simultaneously is 82 dBA.

Table A

Approximate Addition of Sound Levels

Difference Between Two Sound Levels	Add to the Higher of the Two Sound Levels
1 dB or less	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0 dB

(USEPA, Protective Noise Levels, 1978)

3. Temperature and Humidity - Sound energy is absorbed in the air as a function of temperature, humidity and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. Such attenuation is short term and, since it occurs over a great distance, should not be considered in calculations. Higher temperatures tend to increase sound velocity but does

not have an effect on the SPL. Sound waves bend towards cooler temperatures. Temperature inversions may cause temporary problems when cooler air is next to the earth allowing for more distant propagation of sound. Similarly, sound waves will bend towards water when it is cooler than the air and bounce along the highly reflective surface. Consequently large water bodies between the sound source and the receptor may affect noise attenuation over distance.

4. Time of Year - Summer time noises have the greatest potential for causing annoyance because of open windows, outside activities, etc. During the winter people tend to spend more time indoors and have the windows closed. In general, building walls and windows that are closed provide a 15 dB reduction in noise levels. Building walls with the windows open allow for only a 5 dB reduction in SPL.

5. Wind - Wind can further reduce the sound heard at a distance if the receptor is upwind of the sound. The action of the wind disperses the sound waves reducing the SPLs upwind. While it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experienced at the same distance without a wind. This dispels the common belief that sound levels are increased downwind due to wind carrying noise.

6. Land forms and structures - In certain circumstances, sound levels can be accentuated or focused by certain features to cause adverse noise impacts at specified locations. At a hard rock mine, curved quarry walls may have the potential to cause an amphitheater effect while straight cliffs and quarry walls may cause an echo. Buildings that line streets in cities can cause a canyon effect where sound can be reflected from the building surfaces similar to what might happen in a canyon. Consideration of noise impacts associated with these types of conditions may require specialized expertise to evaluate impact potential and to formulate suitable mitigation techniques.

Consideration of existing noise sources and sound receptors in proximity to a proposed activity can be important considerations even when the activity under review is not a noise source. Topography, vegetation, structures and the relative location of noise receptors and sources to these features are all aspects of the environmental setting that can influence noise impact potential. As such, land alteration may also indirectly create an adverse noise impact where natural land features or manmade features serve as a noise barrier or provide noise attenuation for existing sources of noise, i.e. highway, railroads, manufacturing activity. Removal of these features, i.e. hills, vegetation, large structures or walls, can expose receptors to increased sound pressure levels causing noise problems where none had previously existed.

B. Impact Assessment

1. Factors to Consider

Factors to consider in determining the impact of noise on humans, are as follows:

a. Evaluation of Sound Characteristics

(1) Ambient noise level - A noise can only intrude if it differs in character or SPL from the normal ambient sound. Most objective attempts to assess nuisance noise adopt the technique of comparing the noise with actual ambient sound levels or with some derived criterion.

(2) Future noise level - The ambient noise level plus the noise level from the new or proposed source.

(3) Increase In Sound Pressure Level - A significant factor in determining the annoyance of a noise is Sound Pressure Level (SPL). SPLs are measured in decibels.

(4) Sharp and Startling Noise - These high frequency and high intensity noises can be extremely annoying. When initially evaluating the effects

of noise from an operation, pay particular attention to noises that can be particularly annoying. One such noise is the back-up beepers required to be used on machinery. They definitely catch one's attention as they were meant to do. Continual beeping by machinery can be mitigated (see Section V.C. Mitigation - Best Management Practices). Another impulse noise source that can be very annoying is the exhaust from compressed air machinery. This exhaust is usually released in loud bursts. Compressed air exhaust can also be mitigated if it causes a noise problem by using readily available mufflers or specifically designed enclosures.

(5) Frequency and Tone - Frequency is the rate at which a sound source vibrates or makes the air vibrate. Frequency is measured in Hertz (Hz). Frequency can also be classified as high ("sharp"), low ("dull"), and moderate. Pure tones are rare in nature. Tonal sounds usually consist of pure tones at several frequencies. Pure tones and tonal sounds are discerned more readily by the human ear. Pure tones and tonal sounds are compensated for in sound studies by adding a calculated number of dB(A) to the measured sound pressure.

(6) Percentile of Sound Levels - Fluctuations of SPLs can be expressed as a percentile level designated as $L_{(n)}$ where a given decibel level is exceeded *n* % of the time. A designation of $L_{(10)}$ = 70 dBA means the measured SPLs exceeded 70 dBA 10% of the time. A designation of $L_{(90)}$ = 70 dBA means the measured SPLs were exceeded 90% of the time. $L_{(90)}$ is often used to designate the background noise level.

(7) Expression of Overall Sound - Part of the overall assessment of sound is the *Equivalent Sound Level* (L_{eq}) which assigns a single value of sound level for a period of time in which varying levels of sound are experienced over that time period. The L_{eq} value provides an indication of the effects of sound on people. It is also useful in establishing the ambient sound levels at a potential noise source.

In order to evaluate the above factors in the appropriate context, one must identify the following: 1) appropriate receptor locations for sound level calculation or measurement; 2) ambient sound levels and characteristics at these receptor locations; and 3) the sound pressure increase and characteristics of the sound that represents a significant noise effect at a receptor location.

b. Receptor Locations

Appropriate receptor locations may be either at the property line of the parcel on which the facility is located or at the location of use or inhabitance on adjacent property. The solid waste regulations require the measurements of sound levels be at the property line. The most conservative approach utilizes the property line. The property line should be the point of reference when adjacent land use is proximal to the property line. Reference points at other locations on adjacent properties can be chosen after determining that existing property usage between the property line and the reference point would not be impaired by noise, i.e., property uses are relatively remote from the property line. The location of the facility should be shown on a map in relation to each potential receptor. Any future expansion should be described in a narrative as well as depicted on a map. The map and narrative should also include the distance of the operation to each point of reception including the distance at the point in time when an expanding operation will be closest to the receptors.

c. Thresholds for Significant Sound Pressure Level (SPL) Increase

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on

existing SPLs and the character of surrounding land use and receptors. SPL increases approaching 10 dB result in a perceived doubling of SPL. The perceived doubling of the SPL results from the fact that SPLs are measured on a logarithmic scale. An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases. The above thresholds as indicators of impact potential should be viewed as guidelines subject to adjustment as appropriate for the specific circumstances one encounters.

Establishing a maximum SPL at the point of reception can be an appropriate approach to addressing potential adverse noise impacts. Noise thresholds are established for solid waste management facilities in the Department's Solid Waste regulations, 6 NYCRR Part 360. Most humans find a sound level of 60 - 70 dB(A) as beginning to create a condition of significant noise effect (EPA 550/9-79-100, November 1978). In general, the EPA's "Protective Noise Levels" guidance found that ambient noise levels # 55 dBA $L_{(dn)}$ was sufficient to protect public health and welfare and, in most cases, did not create an annoyance (EPA 550/9-79-100, November 1978). In non-industrial settings the SPL should probably not exceed ambient noise by more than 6 dB(A) at the receptor. An increase of 6 dB(A) may cause complaints. There may be occasions where an increase in SPLs of greater than 6 dB(A) might be acceptable. The addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dB(A). This would be considered the "upper end" limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet. Some outdoor activities can be conducted at a SPL of 65 dB(A). Still lower ambient noise levels may be necessary if there are sensitive receptors nearby. These goals can be attained by using the mitigative techniques outlined in this guidance.

Ambient noise SPLs in industrial or commercial areas may exceed 65 dB(A) with a high end of approximately 79 dB(A) (EPA 550/9-79-100, November 1979). In these instances mitigative measures utilizing best management practices should be used in an effort to ensure that a facility's generated sound levels are at a minimum. The goal in an industrial/commercial area, where ambient SPLs are already at a high level, should be not to exceed the ambient SPL. Remember, if a new source

operates at the same noise level as the ambient, then 3 dB(A) must be added to the existing ambient noise level to obtain the future noise level. If the goal is not to raise the future noise levels the new facility would have to operate at 10 dB(A) or more lower than the ambient.(see Table A)

Table B

HUMAN REACTION TO INCREASES IN SOUND PRESSURE LEVEL

Increase in Sound Pressure (dB)	Human Reaction
Under 5	Unnoticed to tolerable
5 - 10	Intrusive
10 - 15	Very noticeable
15 - 20	Objectionable
Over 20	Very objectionable to intolerable

(Down and Stocks - 1978)

Impact assessment will vary for specific project reviews, but must consist of certain basic components for all assessments. Additional examination of sound generation and noise reception are necessary, where circumstances warrant. Sound impact evaluation is an incremental process, with four potential outcomes:

- exemption criteria are met and no noise evaluation is required;
- noise impacts are determined to be non-significant (after first-level evaluation);
- noise impacts are identified as a potential issue but can be readily mitigated (after second level evaluation); or
- noise impacts are identified as a significant issue requiring analysis of alternatives as well as mitigation (third level evaluation).

All levels of evaluation may require preparation of a noise analysis. The required scope of noise impact analysis can be rudimentary to rather sophisticated, depending on circumstances and the results obtained from initial levels of evaluation. Recommendations for each level of evaluation are presented below.

2. Situations in Which No Noise Evaluation is Necessary

When certain criteria are satisfied, the need for undertaking a noise impact analysis at any level is eliminated. These criteria are as follows:

a. The site is contained within an area in which local zoning provides for the intended use as a "right of use". It does not apply to activities that are permissible only after an applicant is granted a special use permit by the local government; and

b. The applicant's operational plan incorporates appropriate best management practices (BMPs [see Section V.C. Mitigation - Best Management Practices]) for noise control for all facets of the operation.

Where activities may be undertaken as a "right of use", it is presumed that noise has been addressed in establishing the zoning. Any residual noise that is present following BMP implementation should be considered an inherent component of the activity that has been found acceptable in consideration of the zoning designation of the site.

3. First Level Noise Impact Evaluation

The initial evaluation for most facilities should determine the maximum amount of sound created at a single point in time by multiple activities for the proposed project. All facets of the construction and operation that produce noise should be included such as land clearing activities (chain saw and equipment operation), drilling, equipment operation for excavating, hauling or conveying materials, pile driving, steel work, material processing, product storage and removal. Land clearing and construction may be only temporary noise at the site whereas the ongoing operation of a facility would be considered permanent noise. An analysis may be required for

various phases of the construction and operation of the project to assure that adverse noise effects do not occur at any phase.

To calculate the sound generated by equipment operation, one can consult the manufacturers' specifications for sound generation, available for various types of equipment. Another option for calculating the sound to be generated by equipment is to make actual measurements of sound generated by existing similar equipment, elsewhere.

Tables C and D summarize noise measurements from some common equipment used in construction and mining. Table E summarizes the noise level, in decibels (dB[A]), from some common sources. This information can be used to assist Department staff in relating potential noise impacts to sound levels produced by commercial and industrial activities. Use of these tables in the first level of analysis will help determine whether or not noise will be an issue and whether actual measurements should be made to confirm noise levels.

Table C

PROJECTED NOISE LEVELS

Noise Source	Measurements	1,000 feet	2,000 feet	3,000 feet
Primary and secondary crusher	89 dB(A) at 100 ft	69.0 dB(A)	63.0 dB(A)	59.5 dB(A)
Hitachi 501 shovel loading	92 dB(A) at 50 ft	66.0 dB(A)	60.0 dB(A)	56.5 dB(A)
Euclid R-50 pit truck loaded	90 dB(A) at 50 ft	64.0 dB(A)	58.0 dB(A)	54.4 dB(A)
Caterpillar 988 loader	80 dB(A) at 300 ft	69.5 dB(A)	63.5 dB(A)	60.0 dB(A)

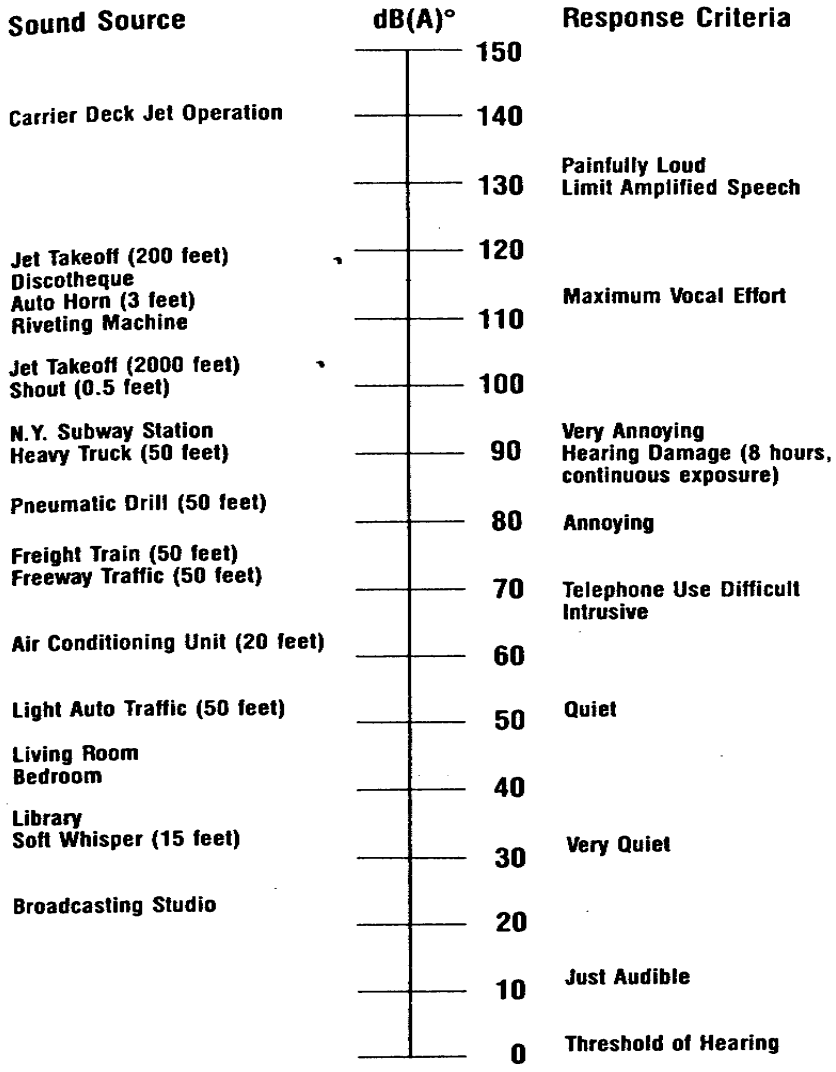
(The Aggregate Handbook, 1991)

Table D
Common Equipment Sound Levels

EQUIPMENT	**DECIBEL LEVEL**	**DISTANCE** in feet
Augered earth drill	80	50
Backhoe	83-86	50
Cement mixer	63-71	50
Chain saw cutting trees	75-81	50
Compressor	67	50
Garbage Truck	71-83	50
Jackhammer	82	50
Paving breaker	82	50
Wood Chipper	89	50
Bulldozer	80	50
Grader	85	50
Truck	91	50
Generator	78	50
Rock drill	98	50

(excerpt and derived from Cowan, 1994)

Table E



(The Aggregate Handbook, 1991)

The sound level at receptor locations should be calculated using the inverse square rule whereby sound is attenuated over distance. Again, each doubling of the distance from the source of a noise decreases the SPL by 6 dB(A) at distances greater than 50 feet. This calculation should first consider the straight line distance between the point of noise generation and the point of noise reception with the presumption that no natural or manmade features exist along the transect between the two points that would further attenuate sound level. Calculations should be performed for each point of reception in all directions being careful to evaluate the worst case noise impact potential by considering activities at the point where they would be closest to a receptor. The sound level calculated for the point of reception should be related to ambient sound levels. Ambient sound levels can be either measured or assumed based on established references for the environmental setting and land use at the point of reception. For estimation purposes, ambient SPLs will vary from approximately 35 dB(A) in a wilderness area to approximately 87 dB(A) in a highly industrial setting. A quiet seemingly serene setting such as rural farm land will be at the lower end of the scale at about 45 dB(A), whereas an urban industrial area will be at the high end of this scale at around 79 dB(A) (EPA 550/9-79-100, November 1978). If there is any concern that levels based on reference values do not accurately reflect ambient SPL, field measurements should be undertaken to determine ambient SPLs.

Where this evaluation indicates that sound levels at the point of reception will not be perceptible, similar to or only slightly elevated as compared to ambient conditions, no further evaluation is required. When there is an indication from this initial analysis that marginal or significant noise impact may occur, further evaluation is required. In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive. (see B.1.a Evaluation of Sound Characteristics)

4. Second Level Noise Impact Evaluation

Further refine the evaluation of noise impact potential by factoring in any additional noise attenuation that will be provided by existing natural topography, fabricated structures such as buildings, walls or berms or vegetation located between the point of noise generation and noise reception. This analysis may require consideration of future conditions and the loss of natural noise buffers over time.

Dense vegetation that is at least 100 feet in depth will reduce the sound levels by 3 to 7 dB(A). Evergreens provide a better vegetative screen than deciduous trees. Keep in mind that if a vegetative screen does not currently exist, planting a vegetative screen may require 15 or more years of growth before it becomes effective.

The degree to which topography attenuates noise depends on how close the feature is located to the source or the receptor of the noise. Topography can act as a natural screen. The closer a hill or other barrier is to the noise source or the receptor, the larger the sound shadow will be on the side opposite the noise source. Certain operations such as mining and landfills may be able to use topography to maintain a screen between the operation and receptors as they progress. Mining operations may be able to create screens by opening a mine in the center of the site using and maintaining the pit walls as barriers against sound (Aggregate Handbook, 1991).

If after taking into account all the attenuating features the potential still exists for adverse noise impact, other types of noise analyses or modeling should be used to characterize the source. An Equivalent Sound Level (L_{eq}) analysis or a related type of noise analysis may better define activities or sources that require more mitigation or isolation so that noise emanating from these sources will not cause an adverse impact.

Where it is demonstrated that noise absorbing or deflecting features further attenuate sound reception to a level of no significant increase, no further analysis is necessary. Where it is determined that noise level or the character of the noise may

have a significant adverse effect on receptors, other noise mitigation measures should be evaluated in an expanded noise analysis.

5. Third Level - Mitigation Measures

When the above analyses indicate significant noise effects may or will occur, the applicant should evaluate options for implementation of mitigation measures that avoid, or diminish significant noise effects to acceptable levels (see Section V.C. Mitigation - Best Management Practices). Adequate details concerning mitigation measures and an evaluation of the effectiveness of the mitigative measures through additional sound level calculations should be provided in a noise analysis. These calculations are to factor in the noise reduction or avoidance capabilities of the mitigation measures. In circumstances where noise effects cannot readily be reduced to a level of no significance by project design or operational features in the application, the applicant must evaluate alternatives and mitigation measures in an environmental impact statement to avoid or reduce impacts to the maximum extent practicable per the requirements of the State Environmental Quality Review Act (SEQR).

The noise analysis should be part of the application or a supplement to it, and will be part of the SEQR environmental assessment by reference. Duplicative noise analysis information is not required for the permit application and the assessment of impacts under SEQR. A proper analysis can satisfy information needs for both purposes.

C. Mitigation - Best Management Practices (BMP) for Reducing Noise

Various noise abatement techniques are available for reducing frequency of sound, duration of sound or SPLs at receptor locations. The mitigation techniques given below are listed according to what sound characteristic they mitigate.

1. Reduce noise frequency and impulse noise at the source of generation by:

   a. Replacing back-up beepers on machinery with strobe lights (subject to other requirements, e.g., OSHA and Mine Safety and Health Administration, as applicable). This eliminates the most annoying impulse beeping;

   b. Using appropriate mufflers to reduce the frequency of sound on machinery that pulses, such as diesel engines and compressed air machinery;

   c. Changing equipment: using electric motors instead of compressed air driven machinery; using low speed fans in place of high speed fans;

   d. Modifying machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces; and

2. Reduce noise duration by:

   a. Limiting the number of days of operation, restricting the hours of operation and specifying the time of day and hours of access and egress can abate noise impacts.

   b. Limiting noisier operations to normal work day hours may reduce or eliminate complaints.

Limiting hours of construction or operation can be an effective tool in reducing potential adverse impacts of noise. The impacts of noise on receptors can be

significantly reduced by effectively managing the hours at which the loudest of the operations can take place.

Implementation of hours of operation does not reduce the SPL emanating from a facility. Determining whether or not hours of operation will be effective, mitigation requires consideration of: public safety, for example road construction at night may reduce traffic concerns and facilitate work; duration of the activity, is it a one time event necessary to meet a short term goal or will the activity become an ongoing operation; and surrounding land use, consider what type(s) of land use is proximal to the activity and at what time(s) might a reduction of noise levels be necessary. There may be other factors to consider due to the uniqueness of a given activity or the type of land use adjacent to the activity. Hours of operation should also consider weekend activities and legal holidays that may change the types of land use adjacent to the permitted activity or increase traffic levels in an area.

The best results from using hours of operation as a mitigative measure will be obtained if the hours are negotiated with the owner or operator of the facility. The less noisy aspects of an operation may not have to be subject to the requirements of hours of operation such as preparing, greasing and maintaining machinery for the upcoming day's operation. The more noisy operations can be scheduled to begin when people in the receptor area are less likely to be adversely effected. Hours of operation should be included in the operation plans for a facility that becomes part of the permit, or in the event that there is no operation plan, can be included as a permit condition.

3. Reduce Noise sound pressure levels by:

   a. Increasing the setback distance.
   b. Moving processing equipment during operation further from receptors.
   c. Substituting quieter equipment (example - replacing compressed air fan with an electric fan could result in a 20 dB reduction of noise level).

d. Using mufflers selected to match the type of equipment and air or gas flow on mechanical equipment.
e. Ensuring that equipment is regularly maintained.
f. Enclosing processing equipment in buildings (example - enclosing noisy equipment could result in an 8-10 dB noise level reduction, a 9 inch brick wall can reduce SPL by 45-50 dB).
g. Erecting sound barriers such as screens or berms around the noise generating equipment or near the point of reception. The angle of deflection also increases as the height of a screen or barrier increases. Screens or barriers should be located as close to the noise source or the receptor as possible. The closer the barrier is located to the source or the receptor, the greater the angle of deflection of the sound waves will be creating a larger "sound shadow" on the side opposite the barrier. Stockpiles of raw material or finished product can be an effective sound barrier if strategically placed.
h. phasing operations to preserve natural barriers as long as possible.
i. altering the direction, size, proximity of expanding operations.
j. Designing enclosed facilities to prevent or minimize an SPL increases above ambient levels. This would require a noise analysis and building designed by a qualified engineer that includes adequate ventilation with noise abatement systems on the ventilation system.

Public notification of upcoming loud events can also be used as a form of mitigation although it doesn't fit easily into the categories above. People are less likely to get upset if they know of an upcoming event and know that it will be temporary.

The applicant should demonstrate that the specific mitigation measures proposed will be effective in preventing adverse noise effects on receptors.

D. Decision Making - Conditioning Permits to Limit Noise Impacts

Preferably, the mitigation measures as outlined in the construction and operational plans should be relied upon to mitigate the effects of noise on receptors. The permit should state that the activity will be conducted in accordance with the approved plan. Otherwise, mitigation measures and BMP's can be imposed within specific permit conditions.

It is not the intention of this guidance to require decibel limits to be established for operations where such limits are not required by regulation. There are, however, instances when a decibel limit may be established for an operation to ensure activities do not create unacceptable noise effects, as follows:

1. The review of a draft and final environmental impact statement demonstrates the need for imposition of a decibel limit;
2. A decibel limit is established by the Commissioner's findings after a public hearing has been held on an application;
3. The applicant asks to have a decibel limit to demonstrate the ability to comply; or
4. A program division seeks to establish a decibel limit as a permit condition, when necessary to demonstrate avoidance of unacceptable noise impact.

Ultimately, the final decision must incorporate appropriate measures to minimize or avoid significant noise impacts, as required under SEQR. Any unavoidable adverse effects must be weighed along with other social and economic considerations in deciding whether to approve or deny a permit.

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9) United States Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, EPA 550/9-74-004, March 1974, Office of Noise Abatement and Control, Washington, D.C.

10) City of Davis General Plan, Appendix E Background Information on Environmental Acoustics, November 1996.

11) The Australian National University, “Physics and Psychophysics of Music”, ACAT 1003, David Worrall, http://www.anu.edu.au/ITA/ACAT/drw/PPofM/Intensity2.html, 1998.

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Additional Reading

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c. Diehl, George, M., Machinery Acoustics, John Wiley & Sons, New York, 1973.

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e. Jensen, Paul, et al, Industrial Noise Control Manual, U.S. Department of Health, Education and Welfare, Public Health Service, Cincinnati, 1978.

APPENDIX B - INSTRUMENT CALIBRATION SHEETS

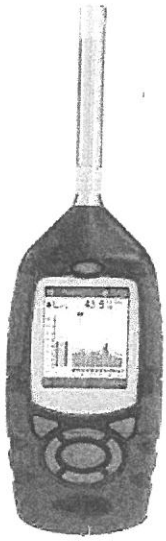
837

CASELLA

Certificate of Conformity and Calibration

FA05190

Instrument Type:-	**CEL-633C**
Serial Number	4210504
Firmware revision	V006-05
Microphone Type:-	**CEL-251**
Serial Number	05084
Preamplifier Type:-	**CEL-495**
Serial Number	005056
Instrument Class/Type:-	1



Applicable standards:-

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- *The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	**Test Engineer:-**	Nicola Cartwright
	32 %RH	**Date of Issue:-**	July 4, 2022
	1014 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

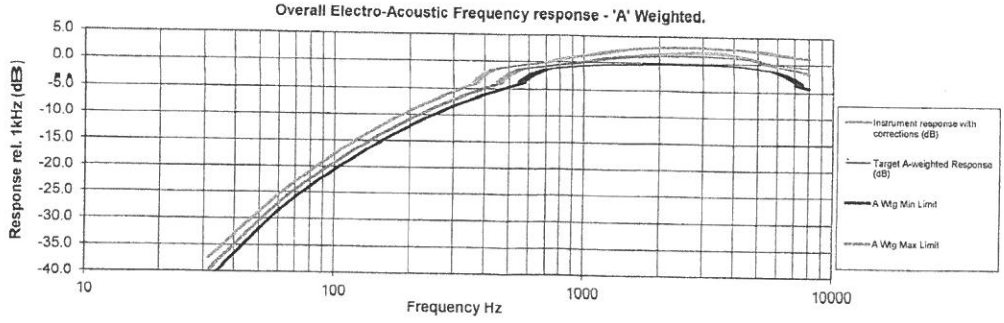
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - *A Weighted*

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Telephone: +86-21-31263188
Email: info@casellasolutions.cn

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 17320
Description Quest SoundPro DL-2-1/3
Calibrated 5/27/2022

Manufacturer Quest
Model Number SoundPro DL-2-1/3
Serial Number BIJ090026
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 40

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

				(As Of Cal Entry Date)	
Test Instrument ID	Description	Manufacturer	Serial Number	Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

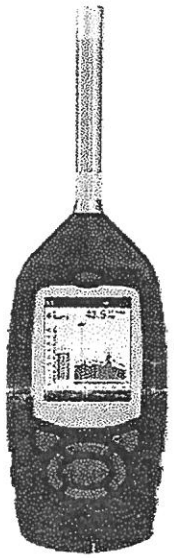
Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

CASELLA

Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	0442231		
Firmware revision	V129-09		
Microphone Type:-	**CEL-252**	**Preamplifier Type:-**	**CEL-495**
Serial Number	89713	Serial Number	001775
Instrument Class/Type:-	2		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	Test Engineer:-	Paul Blackwell
	25 %RH	Date of Issue:-	December 22, 2021
	1015 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

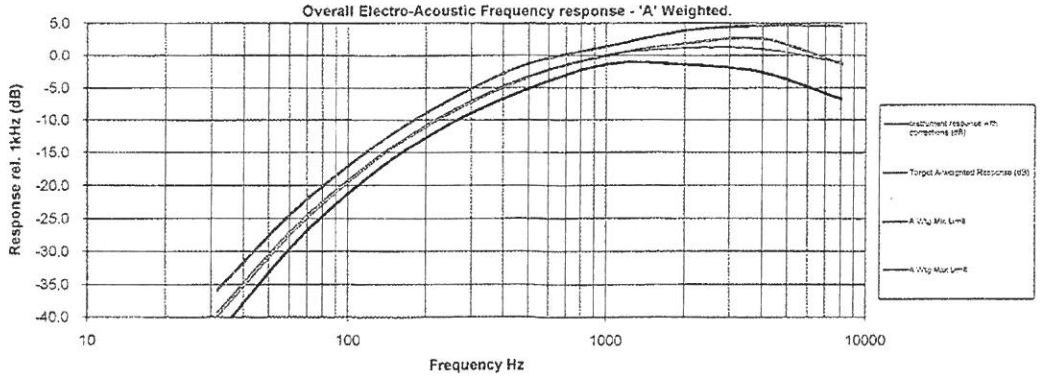
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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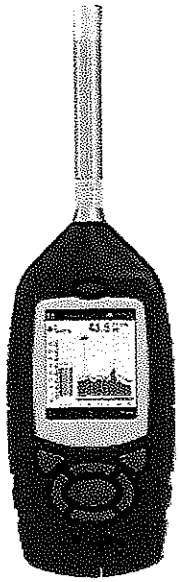
Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	4637949		
Firmware revision	V129-09		
Microphone Type:-	**CEL-252**	**Preamplifier Type:-**	**CEL-495**
Serial Number	60590	Serial Number	002125
Instrument Class/Type:-	**2**		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	23 °C	**Test Engineer:-**	Paul Blackwell
	33 %RH	**Date of Issue:-**	December 14, 2021
	1021 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
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C-peak Sound Levels	**All Tests Pass**
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Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

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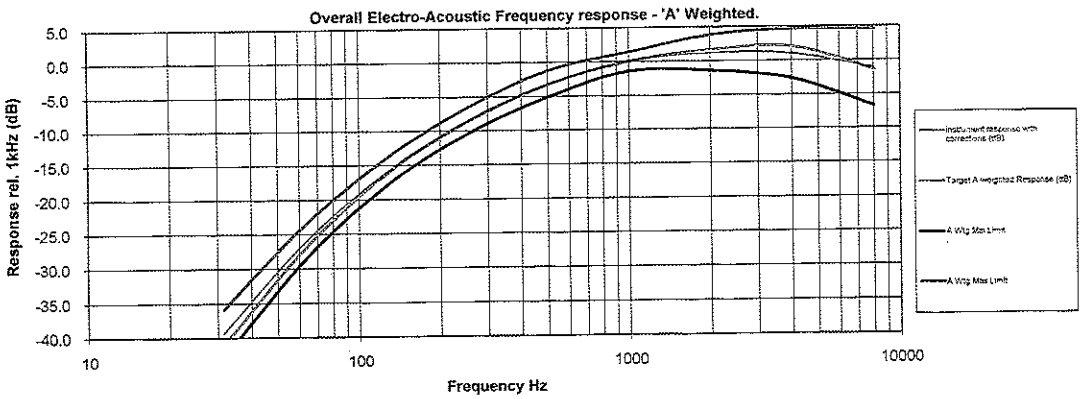

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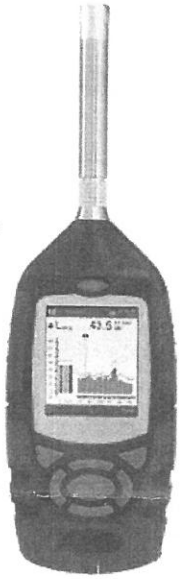
Certificate of Conformity and Calibration



Instrument Model:- CEL-633C

Serial Number 2145334
Firmware revision V129-09

Microphone Type:- CEL-251
Serial Number 5766

Preamplifier Type:- CEL-495
Serial Number 004239

Instrument Class/Type:- 1

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-

23 °C
29 %RH
999 mBar

Test Engineer:- Paul Blackwell
Date of Issue:- April 12, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

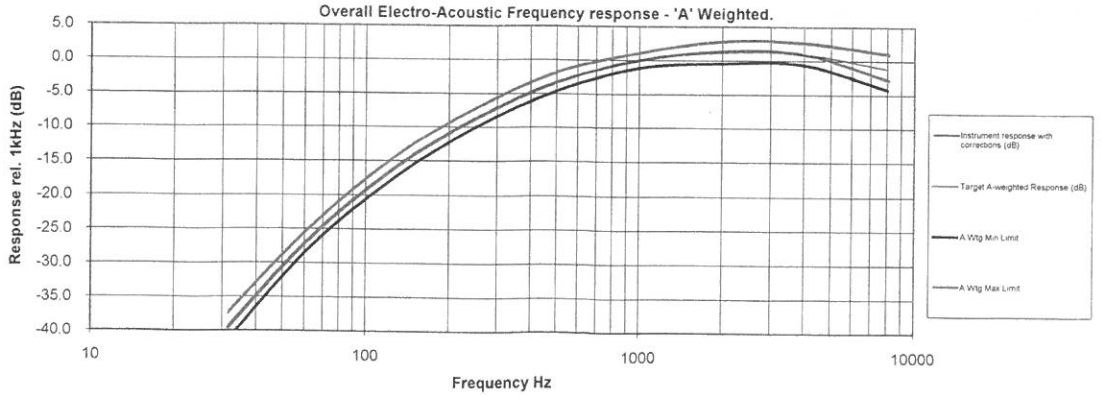
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



Casella UK
Regent House, Wolseley Road, Kempston, Bedford MK42 7JY United Kingdom
Tel: +44 (0) 1234 844100
Fax: +44(0) 1234 841490
E-mail: info@casellasolutions.com

Casella USA
415 Lawrence Bell Drive, Unit 4 Buffalo, NY 14221, USA
Toll Free (800) 366-2966
Tel: +1 (716) 276 3040
E-mail: info@casellausa.com

Casella India
Ideal Industries India Pvt.Ltd.
229-230, Spazedge, Tower -B Sohna Road, Sector-47, Gurgaon-122001, Haryana , India.
Tel: +91 124 4495100
E-mail: casella.sales@ideal-industries.in

Casella China
Ideal Industries China
Room 305, Building 1, No.1279, Chuanqiao Rd, Pudong New District, Shanghai, China
Tel: +86-21-31263188
Fax: +86-21-61605906
Email: info@casellasolutions.cn

CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-120/1
Serial Number:	5230919
Job Number:	25508
Date of Issue:	12-Apr-2022
Engineer:	P Blackwell

Traceable Equipment:		
	Reference Calibrator	EQ11085
	DVM type Fluke 45	EQ00318

Test Conditions:

Ambient Temperature	23.0	°C
Ambient Humidity	29.0	%RH
Ambient Pressure	999	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.04 dB	N/A dB	1.0000 kHz
Final Reading	114.00 dB	N/A dB	1.0000 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

Casella UK
Regent House, Wolseley Road, Kempston, Bedford MK42 7JY United Kingdom
Tel: +44 (0)1234 844100
Fax: +44(0)1234 841490
E: info@casellasolutions.com

Casella USA
13 Pratts Junction Road, Sterling, MA 01564-2305 USA
Toll Free: (800) 366 2966
E: info-us@casellasolutions.com

Casella India
IDEAL Industries India Pvt. Ltd
229-230 Tower-B, Spazedge, Sector 47, Sohna Road, Gurgaon-122001, India
Tel: +91 124 4495100
E: Casella.Sales@ideal-industries.in

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IDEAL Industries China
Room 305, Building 1, No. 1279, Chuanqiao Rd, Pudong New District, Shanghai, China
Tel: +86 21 31263188
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E: Info@casellasolutions.cn

Casella Australia
IDEAL Industries (AUST) Pty. Ltd
Unit 17, 35 Dunlop Rd, Mulgrave. VIC 3170, Australia
Tel: +61 3 9562 0175
E: australia@casellasolutions.com

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 5392
Description Quest QC-10 Acoustic Calibrator
Calibrated 5/26/2022

Manufacturer Quest
Model Number QC-10
Serial Number QID050172
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 35

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

APPENDIX C -
PHOTO LOG

Photo 1: M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad.



Photo 2: M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad.



Photo 3: M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad.



Photo 4: M-4 – Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad.



Photo 5: M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad.

APPENDIX D -
MODEL DATA

SOUND SOURCE

SOURCE	SOUND POWER LEVEL dBA	HEIGHT ABOVE GROUND (m)
M109A3GN (155 mm) Howitzer	176	2

MODEL CONFIGURATION

MODEL PARAMETER	SETTINGS
Atmospheric Absorption	20°C / 70% Humidity
Ground Absorption	0.7G Ground Factor
Receiver Height	1.5 meters for sound level isolines and receivers
Model Radius	3,218 m

MODELED SOUND LEVEL AT RECEIVERS

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	75	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	107	1.5

APPENDIX E -
Noise emission data for M109, 155 mm field howitzer

https://www.ffi.no/no/Rapporter/07-02530.pdf

APPENDIX E – 2022 BALLISTICS TEST RANGE SOUND ANALYSES SCOPE OF WORK

H2H GEOSCIENCE ENGINEERING

179 River Street, Troy, New York 12180

Environmental Professionals
Geologic Consultants
Construction Services

(518) 270-1620/Fax (518) 270-1672

November 9, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analysis at the above reference site.

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following Scope of Work (SOW).

Scope of Work

H2H intends to collect ambient (no unapproved UCI operations taking place) sound levels, as well has additional sound level modeling to support a revised sound study, to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application.

Task 1: Sound Level Monitoring

H2H has developed a Site Overview Map (Figure 1) showing all identified receptors within a two-mile radius (Project Area) of the ballistics testing Firing Pad. The Firing Pad (100 ft. by 100 ft.) is in the northeast corner of parcel 38.1-1-31.000 (UCI Site). The Control Operations Area is located adjacent to the Firing Pad; the Target Area is located 590 ft. west of the Firing Pad (Figure 2).

Forty-two Residential Receptors (occupied residential structure) were identified with the two-mile radius. Four parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius.

Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Firing Pad to best determine ambient sound level conditions in the Project Area. H2H will conduct sound level monitoring at each of the identified five-monitoring location (Figure 1) to identify, and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for the area surrounding each monitoring location.

The following is a description of each sound monitoring location:

M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-2 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surround Pulsifer Rd.

M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

M-4 - Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Task 2: Sound Level Modeling

Based on source sound level data (loudest kinetic systems to be tested) provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURES

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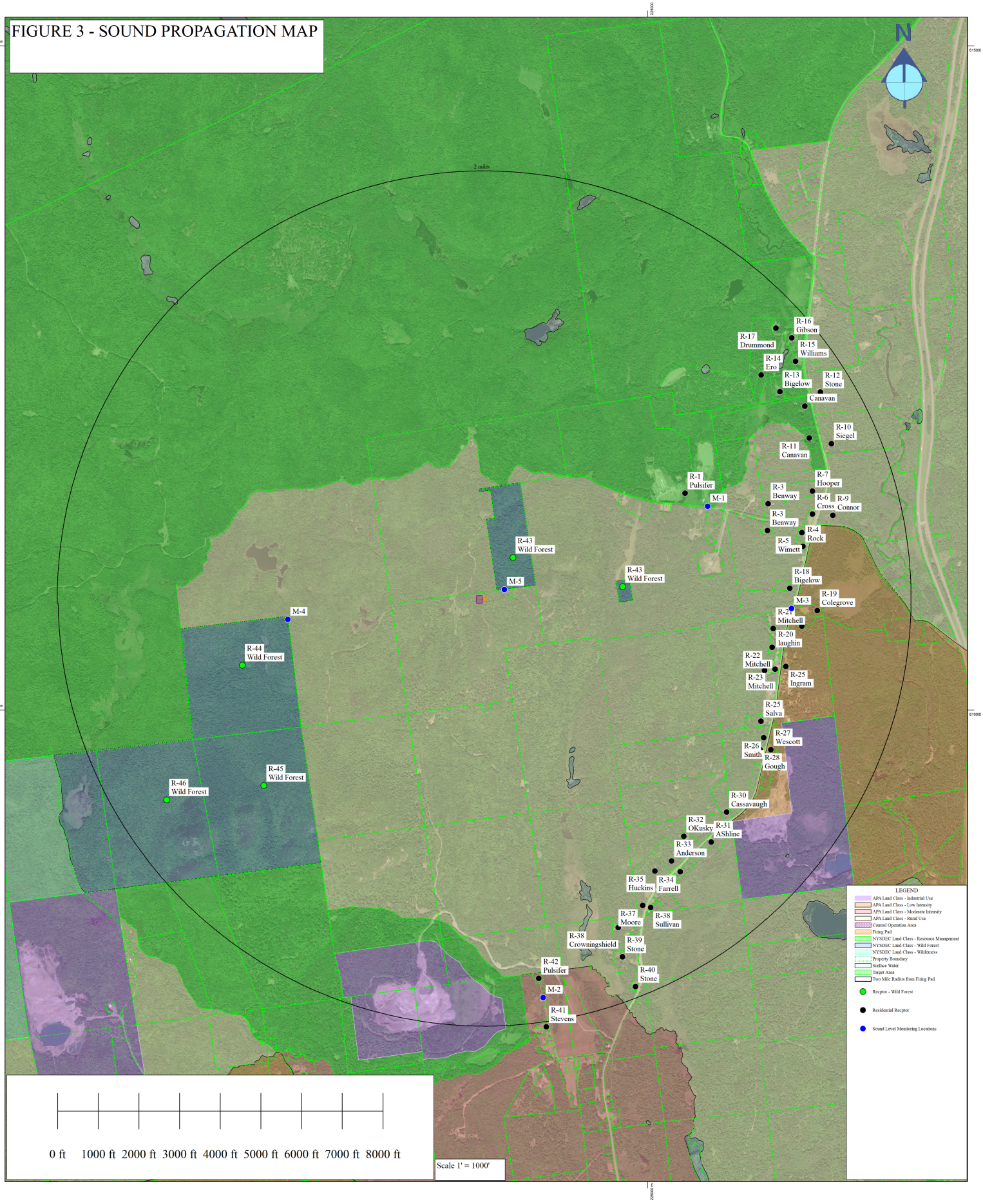
FIGURE 3 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
M-1
R-7 Hooper
R-3 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
R-43 Wild Forest
M-5
R-18 Bigelow
M-3
R-19 Colegrove
M-4
R-21 Mitchell
R-20 laughin
R-44 Wild Forest
R-22 Mitchell
R-23 Mitchell
R-25 Ingram
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-42 Pulsifer
R-40 Stone
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Recptor - Wild Forest
Residential Recptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1' = 1000'

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FIGURE - 2 SITE MAP



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ATTACHMENT E

New York State
Adirondack
Park Agency

KATHY HOCHUL
Governor

BARBARA RICE
Executive Director

FOURTH NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions Testing Facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submissions in relation to APA Project No. 2021-0276, received by the Agency on February 28 and March 1, 2023. The submissions provided important information in response to the Agency's June 6, 2022 Third Notice of Incomplete Permit Application (NIPA).

Based upon staff review of your proposal and the information submitted in response to the Agency's June 6, 2022 Third NIPA, the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the June 6, 2022 Third Notice of Incomplete Permit Application was not submitted and is required to review the application.

You will receive a Notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

March 16, 2023
Date

/s/John M. Burth
John M. Burth
Environmental Program Specialist 3 (EPS3

Attachment: List of Requested Information

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this notice by e-mail to Frederick.aldinger@apa.ny.gov All application submissions should be in PDF or similar format and be legible. Electronic copies of plans must be fully scalable.

1. **January 13, 2022 Notice of Incomplete Permit Application (NIPA) Item 1:** Please clarify if safety signage will be placed on the property and update the Site Plan accordingly.

2. **January 13, 2022 NIPA Item 4:** The proposed maximum noise source in the Sound Study prepared by H2H Geoscience Engineering is a howitzer M109A3GN (155 mm), with a corresponding maximum sound level of 176 dBA measured at 820 feet. The provided noise source information is from a 45-page report titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defense Research Establishment (FFI), dated 5 December 2007. The introduction of the report states that "M109 is one of the noisiest weapons in the Norwegian defense, and as such represents a limiting factor for activity at firing ranges and training fields." The study is based upon utilizing a detonation of 1 kg of TNT 35 meters (114 feet) from the source location of a howitzer with calculations for ground correction, meteorological variances and other factors. The author of the report repeatedly admits that, to their knowledge, there is no consensus or commonly accepted method to produce free field emission data for firing large weapons close to the ground.

   The provided noise source for this proposal is therefore questionable absent other supporting noise data, and the sound pressure level utilized in the provided model input is 176 dBA, which is a corrected measurement from 250 meters or 820 feet away. The actual noise level in proximity to the source, i.e. at the howitzer muzzle, is unknown, but presumably significantly louder. Therefore, the provided noise assessment is based upon a model input of 176 dBA which is 820 feet away from the noise source, skewing or significantly reducing the model output results.

   The provided noise assessment and model need to account for this major discrepancy. For instance, the noise monitoring location M-5, which is state land classified as Wild Forest, is located 510 feet from the 100 foot by 100 foot gravel firing pad noise source, which is less than 820 feet away, but the modeled output sound level is 107 dBA. Utilizing the same 176 dBA at 820 feet, the estimated noise level at M-5 located at 510 feet, which is 310 feet closer, would be greater than 176 dBA, not less.

   Given these discrepancies and absent additional supporting information, the provided noise assessment is unacceptable. Please also refer to the previous Agency correspondence requests for significant revisions to the proposal. Please address the following:

   - The provided response regarding the use of tanks or armored machinery for transport or testing is inadequate. The provided noise assessment report states that all test equipment and instrumentation will be portable and will be removed from the site at the end of test, with no more than 3 tests per month, and each test will consist of 4 – 5 shots. The provided Norwegian noise source study states that M109 is a 155 mm howitzer that is placed on an armored tracked vehicle. Per NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts, please

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provide a more complete noise assessment that includes all sources of noise generation, including fixed and mobile equipment (armored and unarmored) and transport movements of materials including testing and instrumentation.

- In order to support the provided sound propagation model outputs, please revise the noise source level for a sound pressure level at or in proximity to the howitzer muzzle noise source (not 820 feet away) and also provide empirical sound pressure level calculations for each of the receptor locations, M-1 through M-5, and provide an impact assessment utilizing these calculations in comparison to each monitoring locations provided measured ambient sound level.

- The provided noise assessment does not include or factor in varying weather conditions, changes in wind direction and speed, temperature and humidity and atmospheric inversions. Please revise to evaluate changes in weather as per NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts.

3. **January 13, 2022 NIPA Item 5:** The provided response and Sound Study from H2H does not address additional sound mitigation measures. Until an acceptable full noise assessment has been provided, the Agency cannot assess whether the currently proposed public notification and mitigation is adequate.

4. **Project discrepancies:** There are several discrepancies regarding the proposal in the materials submitted to date, including but not limited to:

   - In the initial project proposal, received by the Agency November 19, 2021, the project is described as "...No more than three tests per month are anticipated. Each test will consist of 1 – 3 shots, and each series of shots will last no more than 2 days. These tests are anticipated to continue for a period of 5 years, with an average of no more than 30 shots per year." The Sound Study prepared by H2H Geoscience Engineering, received by the Agency March 1, 2023, describes the project as "No more than three tests per month are anticipated. Each test will consist of four-five shots, and each series of shots will last no more than two days...". Please clarify the maximum number of shots proposed per day.

   - The "Noise emission data for M109, 155 mm field howitzer" study referenced in the Sound Study prepared by H2H references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency July 18, 2022 reference the sound level for a M4A2 zone 7 charge. How do the two charges compare and what effect will they have on the level of sound produced? What is the maximum charge proposed to be used during testing?

Please provide an updated, consolidated project description and plan that accurately reflects the current project proposal and eliminates these and all other changes and discrepancies. Please also revise the Site Plan so that the size and scale of the Firing Pad is accurately depicted.

cc: Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

ATTACHMENT F

New York State
Adirondack
Park Agency

KATHY HOCHUL
Governor

BARBARA RICE
Executive Director

August 16, 2023

Matthew D. Norfolk, Esq.
1936 Saranac Ave, Suite 106
Lake Placid, NY 12946

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received on August 1, 2023. The submission provided important information in response to the Agency's March 16, 2023 Fourth Notice of Incomplete Permit Application (NIPA). As a result, Item 1 of the March 16, 2023 NIPA is either satisfied or no longer required.

As further outlined below, the remaining information required by the Agency's March 16, 2023 NIPA is still required to review the application. A copy is enclosed for your convenience. You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

Specifically, the provided response does not address the following:

- Noise mitigation measures are not proposed or evaluated. The submission states that "(T)here are no other practicable means to mitigate noise from a noise source such as the one being tested." This statement is un-supported given that berms, enclosures, and/or silencers (schalldampfer), or any other potential noise mitigation measures are not discussed or evaluated, and no documentation has been provided supporting the assertion that noise mitigation measures are not practicable.

- The provided response does not evaluate varying weather conditions, changes in wind direction and speed, temperature and humidity and atmospheric inversions as requested. The submission only states that the noise model accounted for appropriate weather conditions per ISO specifications with no further details.

- Only the noise model outputs were provided for receptor locations M-1 through M-5, and not the previously requested empirical sound pressure level calculations for each of the receptor locations. Absent these calculations, the model results are unsupported. In addition, the modeled noise results as depicted in Figure 5 of the response appears to be depicted at an inaccurate scale. As previously requested in the June 6, 2022 Third NIPA and March 16, 2023 Fourth NIPA and as discussed during our July 25, 2022 and June 26, 2023 meetings, provide all empirical sound pressure level calculations for each of the receptor locations.

- The Norwegian study, a 45-page report titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defence Research Establishment (FFI), dated 5 December 2007, is the sole source of data inputs for the provided noise assessment which is based upon a simulated and modeled study utilizing a detonation of 1 kg of TNT 35 m (114 ft) from the source location of a howitzer. The provided revised noise assessment is based upon further modeling of the Norwegian study findings, stating that "(T)he Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB showing correlation within ISO standards." In effect, the provided revised noise assessment asserts that a 3.5 dB modeled discrepancy is tolerable for estimating noise impacts from firing military grade weapons within proximity to State Land and residential receptors. The provided noise assessment also utilizes a revised calculated noise source of 180.8 dB at the howitzer barrel. However, as previously requested, the calculations were not provided to support this component. The closest receptor location of M-5, which represents a receptor on State Land classified as Wild Forest has a modeled estimated noise level of 130 dB. However, as previously acknowledged, the model has an at least 3.5 dB discrepancy from the Norwegian study results, therefore it can be reasonably assumed based on the limited information provided that the M-5 receptor location can exhibit up to 133.5 dB, which exceeds the US Bureau of Mining's Report 8507 standard of 133 dB for over air blasts associated with mining activities as referenced in NYSDEC mining permit conditions. Also, please note that this location is approximately 510 feet from the firing pad, and not at the worst-case scenario location of the southwest corner of the same state land parcel approximately 300 feet from the northeast corner of the firing pad. Therefore, based on the information provided to date, the weapons firing activity proposal as presented has the potential to create an undue adverse impact for howitzer impulse noise levels greater than 133 dB on State Land classified as Wild Forest. The assertion that this parcel is landlocked State land with no public means of access is irrelevant to the Agency's evaluation of potential for adverse impact upon the park's natural resources, specifically § 805.4.a(4) of the Adirondack Park Agency Act. The necessary information has not been provided to indicate that there will not be an undue adverse impact from the proposal to fire a M109A3GN 155mm field howitzer up to 2 times per day up to 3 days in a row, for an average of 30 times per year for 5 years, as close as approximately 300 ft as measured from the corner of the proposed 100-foot by 100-foot gravel firing pad to the corner of State Land Classified as Wild Forest.

- The response "The level of sound for all charge sizes employed will not exceed those acceptable levels determined by H2H's assessments and testing." does not provide the requested comparison between previously referenced charges used in testing or what the maximum charge to be used in the proposed testing will be.

  Therefore, based on the provided information regarding potential noise impacts to date, this project does not meet the criteria for issuance of a permit under Agency law and staff cannot recommend approval to the Agency board.

If you have any questions regarding this letter or the project review process, please contact me at (518) 304-6149.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

Attachment: March 16, 2023 NIPA

cc: Michael Hopmeier
Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Mike Flynn, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

ATTACHMENT G

New York State
Adirondack
Park Agency

KATHY HOCHUL
Governor

BARBARA RICE
Executive Director

FIFTH NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on December 15, 2023.

Based upon staff review of your proposal and the information submitted in response to the Agency's March 16, 2023 Fourth Notice of Incomplete Permit Application (NIPA), the following questions must be addressed in order to review your application. Also, as outlined below, some of the information requested in the March 16, 2023 Fourth Notice of Incomplete Permit Application was not submitted and is required to review the application.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger**, who is assigned to review your project.

January 2, 2024
Date

/s/ David J. Plante
David J. Plante, AICP CEP
Deputy Director, Regulatory Programs

Attachment: List of Requested Information

P.O. Box 99 • 1133 NYS Route 86 • Ray Brook, NY 12977 • Tel: 518 891-4050 • www.apa.ny.gov
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REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this Notice by email to frederick.aldinger@apa.ny.gov All application submissions should be in PDF or similar format and be legible. Electronic copies of plans must be fully scalable.

1. The provided materials include a revised sound study prepared by H2H Geoscience Engineering PLLC (referred to herein as the Revised Noise Analysis). The noise modeling included in the Revised Noise Analysis utilizes receptor distance measurements from the proposed gravel pad, but does not clarify which portion of the 100-foot by 100-foot pad the measurements are made from, e.g. at the nearest edge or corner of the gravel pad, the center, or the furthest edge. Varying the location of the howitzer assembly on the gravel pad and the corresponding receptor distance could result in a discrepancy of 141-feet (hypotenuse of pad), which could skew or reduce the estimated sound pressure level in inverse proportion to the square of the distance or 6 dB at 100 feet. As stated in UCI's February 28, 2023, response to the Agency's Third NIPA, "...the specific placement of instrumentation and test articles will vary within a general range based on test requirements. All instrumentation and test articles are portable and will be emplaced before and after each test. As no permanent structures will be deployed, exact position of placement may vary each time."

Please provide cross-section sheet(s) depicting the proposed typical M109 155 mm howitzer and assembly set up to be utilized on site, including all proposed instrumentation and test articles, that is drawn to scale and depicts howitzer barrel and assembly dimensions and muzzle location. Please label the location of the noise source and its associated sound pressure level source height as measured from the finished grade of the pad.

To allow for review of worst-case scenario noise impacts, please provide scaled cross-section plan sheet(s) depicting the distance between the closest point of the proposed gravel pad or the noise source, whichever is closer, to each of M1-M5, and between the closest point of the proposed gravel pad and the receptor located at the southwest corner of the nearest state land parcel. Please depict the proposed berm on each of these plan sheets.

2. Please clarify what materials the berm will be constructed with, and any associated stabilization measures and other erosion and sediment controls.

3. Please provide an evaluation of other potential noise mitigation measures, including enclosures and/or silencers (schalldampfer). Please explain why none of these other noise mitigation measures are included as part of the proposal.

4. Please explain why there are separate tables, calculations and conclusions made in the UCI written response received on December 7, 2023, that are not included in the Revised Noise Analysis. For example, as indicated in the Appendix D, Model Data, the noise analysis model input of atmospheric absorption utilizes

20°C (68°F), and 70% humidity, and does not include an evaluation of varying weather conditions. However, UCI's written response does include information on varying weather conditions and provides separate tables, including Table 1 that references the modeled sound levels and states that "testing is not anticipated to take place under these conditions" referencing temperature 41°F/humidity 0%. Another example of this discrepancy is that the UCI response states "(T)he modeled sound pressure level is 130 dB/107 dB(A) at M-5, and 132 dB and 111 dB(A)at State Land classified as Wild Forest property corner;" however this is not discussed or presented in the Revised Noise Analysis. In addition, the UCI response section references the July 2023 Sound Study and not the Revised Noise Analysis.

5. If testing will not be performed in late fall, winter, or spring conditions when the temperature of 41°F/humidity 0% scenario is a seasonal possibility, please explain why the Revised Noise Analysis included noise monitoring conducted on December 21 and 22, 2022, but model inputs included summer conditions of 20°C (68°F), and 70% humidity. Please clarify the proposed months of operation and any other proposed atmospheric operating restrictions.

Additionally, application materials previously stated that there would be a maximum of two shots fired per day fired for a maximum of three consecutive days, with an average of 30 shots per year, and that shots would occur for a period of five years. The UCI Response received December 15, 2023, states that testing was not anticipated to take place at conditions of 41 degrees Fahrenheit and 0% humidity, and that conditions in the first column of Table 1 are typical for the project site during summer months. Please provide the proposed maximum number of firings per week, month, and year of the testing period.

6. Please revise Image 1 to depict the location of the 100-foot by 100-foot pad, all state land boundaries, the southwest corner of the nearest state land parcel located approximately 300 feet from the northeast corner of the firing pad, the nearest dwellings (including the Pulsifer residence), receptor locations M1 – M4, and the closest point of the proposed gravel pad or the noise source, whichever is closer, to each receptor.

7. A Norwegian study titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defense Research Establishment (FFI), and dated 5 December 2007 (the Norwegian study), is the only source of information included in the application providing noise level data from howitzers. This study includes a noise level of 130.5 dB measured at 803 feet from a howitzer. The Revised Noise Analysis appears to use this 130.5 dB measurement from the Norwegian study to calculate a modeled source noise level for an M109 155 mm howitzer of 180.8 dB. The Revised Noise Analysis then uses 180.8 dB to model noise levels at the M5 receptor on State land as 127 dB, and noise levels at the nearest residence as 100 dB. The Noise Analysis then determines that the 3.5-dB difference between the noise level data in the Norwegian Study and the modeled noise levels at the project site show "correlation within ISO standards."

Please provide an explanation of these ISO standards and the asserted correlation, including a clarification of whether the ISO standards are appropriately used in this context. Please also provide any other available documentation confirming that 3.5 dB is appropriately cited as the maximum limit of error for this proposal.

Please confirm through field-verification at an authorized location and through independent third party verifications that 180.8 dB is the noise level produced by M109 155 mm howitzers.

Please note that NYSDEC's Program Policy "Assessing and Mitigating Noise Impacts" dated October 6, 2000 last revised February 2, 2001 states that "In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive." The approximate noise level of 127 dB does not appear to be in character with the recorded ambient noise level of approximately 37.2 dBA, which per NYSDEC's noise policy, is most similar to wilderness noise levels at approximately 35 dBA.

8. The "Noise emission data for M109, 155 mm field howitzer" study referenced in the Revised Noise Analysis references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency July 18, 2022 reference the sound level for a M4A2 zone 7 charge. Please confirm that this will be the maximum charge used. Please also explain how the two charges compare and the effect will have on the level of sound produced.

9. Please provide an updated noise analysis that accounts for the confirmed height of the noise source from the gravel pad and the location of the noise source at the closest point of the gravel pad to each receptor. This updated noise analysis must include all tabular, calculated, and conclusory information included in the latest UCI response, Modal Data in Appendix D, and barrier attenuation calculations that account for the most conservative/worst case scenario height and location of the noise source in relation to each receptor. The updated noise analysis must also account for all proposed months of operation and any proposed atmospheric operating restrictions. In addition, the analysis must include revised tabular information, Modal Data in Appendix D, and barrier attenuation calculations that account for the height and location of the noise source in relation to each receptor, and must include sound pressure levels expressed as both dB and dBA. This updated analysis must include a cover sheet with the seal of a NYS licensed professional engineer.

cc: Michael Polacco, Project Geologist H2H Geoscience Engineering, PLLC
William H. Kissel, Esq.
Les Howard, Town of Lewis Code Enforcement Officer
Erin Burns, Acting Regional Permit Administrator NYS DEC Region 5
James Pulsifer, landowner

APA Letter Re: Appeal

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April 10, 2024

Matthew D. Norfolk, Esq.
Norfolk Beier PLLC
1936 Saranac Ave, Suite 106
Lake Placid, NY 12946

Re: Hopmeier; Agency Permit Application 2021-0276

Dear Matthew Norfolk:

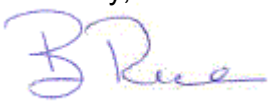
On February 29, 2024, the Agency received your client's appeal of the Fifth Notice of Incomplete Permit Application dated January 2, 2024. Pursuant to Agency regulations at 9 NYCRR § 572.22(h), the Agency shall act on this appeal within 90 days. In addition, § 572.22(d) requires the Agency to provide at least 20 days' notice to certain persons before the appeal.

Given these time frames, staff suggest that your client's appeal be considered during the Agency meeting scheduled for Thursday, May 16, and Friday, May 17, 2024. Your appeal and a reply prepared by staff will be forwarded to the Agency members and posted to the Agency's website the week before the meeting, as part of the Agency's regular mailing. A copy of the staff reply will also be forwarded to you at that time. Any written response received by the close of business on Monday, May 13, 2024, will be distributed to the Agency members.

As required by § 572.22(g) of Agency regulations, your client's appeal will be considered first by the Regulatory Programs committee, with the full Agency then voting on the committee's recommendation. Agency practice allows for ten-minute presentations to the committee by the applicant and staff. These presentations may be followed by questions from Agency members. Under § 572.22(e), no new evidence may be submitted in written or oral form in support of the appeal. In addition, please remember that the Agency will not consider or act on any other aspect of your client's application.

Please confirm that the May 16-17 Agency meeting is acceptable to your client.

Sincerely,



Barbara Rice
Executive Director

Staff Response Memo

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NEW YORK STATE | Adirondack Park Agency

KATHY HOCHUL
Governor

BARBARA RICE
Executive Director

MEMORANDUM

TO: Regulatory Programs Committee

FROM: Sarah Reynolds, Associate Counsel SR

DATE: May 8, 2024

RE: Unconventional Concepts, Inc./Hopmeier
Permit Application 2021-0276
Appeal of Agency staff's January 2024 request for information

Summary

Unconventional Concepts, Inc. (UCI) seeks a permit from the Adirondack Park Agency to allow for the establishment of a commercial use involving the installation of a firing range for the testing of artillery on Rural Use lands in the Town of Lewis, Essex County. On January 2, 2024, Agency staff forwarded a fifth request for information regarding the application. On February 29, 2024, the applicant submitted an appeal of this request.

Since receipt of the initial application on November 21, 2021, the applicant's submissions have provided incomplete and conflicting information regarding the proposal. The type of weapon proposed for testing, the charge proposed for use with the weapon, specifics on the target and any other equipment proposed for use on the site, the proposed firing and target locations, and the number of shots proposed per day, month, and year, have all remained uncertain or changed. Even more significantly, the decibel level for the impulse noise source – the noise level produced at the moment of firing and the basis for any noise analysis – has changed with every response to staff's requests for information. In addition, none of the applicant's submissions have been stamped with the seal of a New York State-licensed professional engineer, as required under State professional standards for projects involving engineering principles and data.

The first four Notices of Incomplete Permit Application (NIPAs), along with numerous follow-up letters and meetings with the applicant, reflect staff's efforts to confirm the specifics of the proposed project and the resulting analysis of potential impacts. The fifth NIPA constitutes a further attempt to determine the information necessary for a complete application, with questions addressing previously submitted information that has changed or has remained unclear or unanswered.

The applicant's February 29, 2024, appeal of the fifth NIPA includes new information that has not been previously provided to the Agency. Staff analysis of this new information indicates that the record now contains sufficient documentation to allow for review of the proposal in relation to Questions 3 and 5 of the fifth NIPA. However, Questions 1, 2, 4, 6, 7, 8, and 9 remain unanswered.

Given the continuing inconsistencies in the record and the potential for impacts from the proposal, staff request that the Agency members affirm the need for the information requested in Questions 1, 2, 4, 6, 7, 8, and 9 of the fifth NIPA.

Legal Background and Review Process

The proposal at issue involves a new commercial use on Rural Use lands, and requires an Agency permit under the Adirondack Park Agency Act (APA Act). Prior to approving this project, the Agency must find that the proposal:

- will be consistent with the land use and development plan;
- will be compatible with the character description and purposes, policies, and objectives of the Rural Use land use area;
- will be consistent with the overall intensity guidelines for the Rural Use land use area;
- will comply with the shoreline restrictions of § 806 of the Act; and
- will not have an undue adverse impact upon the natural, scenic, aesthetic, ecological, wildlife, historic, recreational or open space resources of the Park or upon the ability of the public to provide supporting facilities and services made necessary by the project, taking into account the commercial, industrial, residential, recreational or other benefits that might be derived from the project.

Staff analyze any proposal that requires an Agency permit to ensure that the application is "complete for the purpose of commencing review," as set forth in §809(2)(b) of the APA Act. To do this, staff request information from applicants as necessary to allow for Agency consideration of the findings listed above. For any project not approved pursuant to the Agency's Delegation Resolution, staff make a recommendation to the Agency board as to whether the proposal appears approvable under the required findings, based on staff's analysis of the application materials. The Board may choose to follow or not follow staff's recommendation.

When a complete permit application contains sufficient information to allow the Agency to make the required findings, the Agency may approve the project, with conditions as necessary. When a complete permit application contains disputed facts or insufficient documentation to support approval, the Agency may require an adjudicatory-style public hearing on the proposal. The Agency may only deny a proposal after holding an adjudicatory-style hearing.

Relevant Facts and Project Review History

Project Site

The project site is a 197±-acre parcel of land located on Hale Hill Lane in the Town of Lewis, Essex County, in an area classified Rural Use on the Adirondack Park Land Use and Development Plan Map. The site is identified as Tax Map Section 38.1 Block 1, Parcel 31, and is currently owned by Pulsifer Logging, LLC.

The eastern portion of the project site contains two mountains, Little Church Mountain and Big Church Mountain, which are approximately 1,500 to 1,600 feet in height. A 50±-acre parcel of State lands included in the Taylor Pond Wild Forest adjoins the northeastern portion of the project site; the remainder of the site borders large tracts of Rural Use lands. The closest residence to the site is located approximately 5,800 feet to the northeast, and is currently owned by James Pulsifer. Additional residences are located along Hale Hill Road to the north and east of the site, along State Route 9 to the east of the site, and along Pulsifer Road to the south of the site.

A pre-existing missile silo, currently used as a commercial use, is owned by Diversified Upstate Enterprises, LLC, and located just over a mile to the east of the site. In addition, a sawmill subject to Agency permits is located just under a mile to the north of the site, and the "Oak Hill" mine, also subject to Agency permits, is located approximately a mile and a half to the south. Additional State lands in the Taylor Pond Wild Forest are located to the east and west, and the Jay Mountain Wilderness Area is located approximately two miles to the north and west of the site.

The project site is accessed by an existing drive used for timber harvesting. The site is currently improved by a cabin. A trail traverses the northwestern portion of the site and connects to adjacent Rural Use parcels.

Jurisdictional Inquiry and Permit Application

On August 26, 2021, the Agency received a Jurisdictional Inquiry Form from Michael Hopmeier for the installation of a ballistic testing range on the project site. The Agency responded to this inquiry on September 22, 2021, advising that the proposal involved the establishment of a new commercial use, and that an Agency permit would be required.

On November 19, 2021, the Agency received a permit application from Michael Hopmeier as Project Sponsor and James Pulsifer as representative for landowner Pulsifer Logging, LLC, for the establishment of a new commercial use. Specifically, the application proposed leasing a portion of the project site for the establishment of a "firing range" to:

> be developed and used to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance... In effect, we are building a shooting range and will fire non-toxic, inert, steel projectiles over a distance of approximately 300 yards [or 900 feet].

The testing of artillery would occur in coordination with work occurring at the missile silo facility located to the east of the project site.

The application stated that "no more than three tests per month are anticipated," with operations occurring in "all seasons" and each test consisting of 1-3 shots over 1-2 days between 10am and 4pm on weekdays, and "an average of no more than 30 shots per year." Impulse noise from each shot was "not expected to exceed 180dB." The application also explained that "a small grouping of mountains" on the site would "act as a projectile backstop... thereby allowing for the reflection/deflection of noise away from more populated areas and into a large open space that can absorb and dampen any impact."

The application stated that approximately 100 tons of gravel from the Oak Hill mine would be used to construct an approximately 100-foot by 100-foot firing platform structure; other site work would include "clearing brush and a limited number of trees," using "herbicides to control unrestricted undergrowth," and using the existing access road to bring in materials for each test, including "a mobile power supply such as a generator on a trailer, portable instrumentation carriers, a trailer, a porta potty, and other mobile support equipment." The application noted that "a portable steel cargo container... filled with sand or other aggregate" might be brought on the site as "a projectile-catcher," but was "not expected to be necessary." The application did not offer any further specifics on the type of equipment or weapons that would be used on the project site.

Maps included with the application showed the location of the existing cabin on the property and the general location of the proposed firing pad and range.

First Notice of Incomplete Permit Application and Response

On December 6, 2021, Agency staff issued a first NIPA for the project. This first NIPA included requests for:

- A site map depicting the lease subdivision lines to allow for confirmation of potential subdivision jurisdiction, and documentation of the location of the other proposed activities;

- A noise impact evaluation using the NYS DEC Program Policy for Assessing and Mitigating Noise Impact (DEC Noise Policy)[1];
- Confirmation as to whether any contaminants would be used on site;
- Confirmation as to whether improvements to the existing access road would be required;
- Additional plans, including a plan for removal of spent projectiles, a design guide, a stormwater management plan, an unexploded ordnance plan, and a decommissioning plan;
- An alternatives analysis; and
- Information regarding coordination with other federal, state, and local agencies.

On December 15, 2021, Agency staff attended a site visit with the applicant. On December 22, 2021, the Agency received from the applicant a response to the first NIPA. This response included an un-scaled aerial photograph overlaid with approximations of the proposed lease and firing range areas. In response to staff's questions regarding contaminants and the removal of spent projectiles, the response stated that the "projectiles used during testing will normally consist of solid bullets of steel" and that, "in the event a target is used… the current design envisions a contained quantity of sand or soil (approximately 8 X 8 X 40 ft) into which projectiles will be fired," but noted that "this design may be modified based on actual operation and empirical data." The response also stated that, "if operations do not require a target, then direct impact into the ground… and projectile recovery will be utilized."

The December 22, 2021, response included a written noise evaluation and overlays of aerial photographs using "a complex non-linear topographic multi-variate inverse square law model for noise distribution that considered propagation over a distance, insertion of a barrier, ground effect, and air absorption" to examine impacts at two receptors: the missile silo located just over a mile to the east of the site, and the Pulsifer residence located just over a mile to the northeast. The evaluation stated that the noise level at the location of firing was "not expected to exceed 185 dB." A noise source of 183 dB was used in the calculations, based on which the applicant stated that "we can anticipate a reduction at both sites to approximately 82 dB centered on 125 Hz peak energy frequency, or a reduction of 101 dB." The evaluation then listed the noise levels of shotguns, rifles, Magnums, chainsaws, and thunder from nearby lightning strikes. For mitigation, the December 22, 2021, response proposed following the blasting notification procedures used by the nearby Oak Hill mine, which would be "part of the [firing range's] site security and operations plan." The noise evaluation was not signed by an engineer or any other New York State licensed professional.

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[1] When reviewing projects, Agency staff regularly require completion of a noise impact evaluation for the proposed activity following the review standards established by the DEC in its Program Policy for Assessing and Mitigating Noise Impact. The DEC Noise Policy is available on the DEC website at Assessing and Mitigating Noise Impacts (ny.gov).

The December 22, 2021, response asserted that no stormwater management plan, unexploded ordnance plan, or decommissioning plan was necessary, and declined to confirm whether the proposal involved any upgrades to the existing access road. The applicant also declined to provide a design guide, stating that, "We will be working closely with the US Army Development Command... they will provide guidance and approval for the range design and operating procedures... All operations will be in accordance with either approved and designated Army protocols, or based on best engineering and technical judgment developed in coordination with relevant Army staff and personnel." In relation to potential alternatives, the response stated that "other sites... were considered," but were not chosen because of the existing natural features of the project site. The response declined to propose any on-site alternatives, such as a berm or other sound barrier as suggested by the DEC Noise Policy.

Second Notice of Incomplete Permit Application and Response

On January 13, 2022, Agency staff issued a second NIPA for the project. This second NIPA included requests for:

- A site map and documentation of the location of the proposed activities, including the lease subdivision lines and other details;
- A revised noise impact evaluation using 185 dB as the maximum anticipated impulse noise level as referenced in the applicant's December 22, 2021, response and analyzing potential noise impacts to additional receptors within a two-mile radius;[2]
- A noise mitigation plan, as well as the "site security and safety operations plan" referenced as providing for noise mitigation in the applicant's December 22, 2021, response;
- Information regarding the existing trail that traverses the project site and connects to adjacent private lands;
- An additional analysis of alternatives to the proposal; and
- Additional coordination between the Agency and other state and federal entities.

On February 11, 2022, the Agency received from the applicant a partial response to the second NIPA. This partial response stated that, according to the landowner, there are no outside parties with the right to access the road/trail that traverses the project site. In relation to staff's request for an additional analysis of alternatives, the partial response stated that "it would be impractical to move the testing to a location farther from" the missile silo to the east of the site and that "any attempt to relocate the testing to a significantly more distant area would be cost prohibitive." Finally, in relation to staff's request for an updated noise impact evaluation, this partial response "revised the numbers in the model to accurately reflect the impulse noise value of 185 dBa."[3] The

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2 Pursuant to the DEC Noise Policy, noise evaluations require determining and calculating potential impacts from "the maximum amount of sound created at a single point."

results of this updated assessment were shown on a "Noise Map" depicting noise levels overlaid on an aerial photograph of the area.

At the applicant's request, on February 25, 2022, Agency staff attended a meeting with the applicant to discuss the second NIPA and the materials received on February 11, 2022. Following this meeting and a follow-up letter from staff to the applicant on March 1, 2022, confirming that portions of the second NIPA were considered "either satisfied or no longer required," on May 12, 2022, the Agency received from the applicant an additional response to the second NIPA. In relation to staff's request for a scaled site plan, this additional response included two scaled plans showing a portion of the project site. No lease subdivision lines were shown on these plans. In addition, no dimensions or distances were shown, and not all markings were labeled. According to the scale on the plans, the firing pad measured approximately 30 feet by 80 feet, and the distance between the pad and the target measured approximately 571 feet.

The additional response received on May 12, 2022, stated that, "based on recommendation from the APA, further research on the noise source was performed," with the noise source now "assumed to be 166.1 dB." Specifically, in two locations, the May 12, 2022, response described the "Noise Source" as a "M109A5/6; Paladin, 155mm self-propelled Howitzer firing M4A2 zone 7 charges," with a "Noise Level" of 166.1 dB. The reference materials cited for this noise level showed that the 166.1 dB measurement was taken from "in fighting compartment with hatches open except drivers," rather than from open air firings.

The additional response received on May 12, 2022, also stated that the proposal had been updated to use a soft catch system for projectiles, rather than using direct impact into the mountains as the target as previously proposed. Using an "ambient noise level... assumed to be approximately 80 dB at the [Pulsifer] residence," the additional response then included a series of calculations performed by the applicant and concluded that "there is a negligible difference in noise level [at the Pulsifer residence] across an 8-hr day between a day when two shots are fired and [a] day when no shots are fired." No calculations were provided for any other potential noise receptors, and the noise evaluation was not signed by an engineer or any other New York State licensed professional.

In relation to the Agency's request for a noise mitigation plan, the additional response received on May 12, 2022, described "active noise mitigation measures," such as

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[3] This is the first incidence in the record of a reference to dBa (also referred to as dBA or dB(A)). According to the DEC Noise Policy, "perceived loudness is expressed in decibels (dB) or A-weighted decibel scale dB(A) which is weighted towards those portions of the frequency spectrum, between 20 and 20,000 Hertz, to which the human ear is most sensitive." In general, the same impulse noise source level would be expressed as a higher number when measured in decibels (dB) than in A-weighted decibels (dB(A)). The applicant's submissions vary between references to dB and dB(A) in relation to the impulse noise level and noise impact evaluation. Question 9 of the fifth NIPA requests an updated noise impact evaluation documenting both dB and dB(A) measurements for all relevant sound pressure levels.

limiting the number of shots fired annually, limiting the hours of operation, and providing "early warning of the event" pursuant to the procedures used by the nearby Oak Hill Mine as well as "audible warnings (siren) that can be discerned at" the Pulsifer residence, and concluded that the proposal was "not expected to cause any hearing damage or increases in anxiety or stress in nearby residents." The additional response also described "passive noise mitigation measures," such as the distance from the Pulsifer residence to the proposed testing range, the natural vegetation and local topography, and the fact that, because of "the rock structure of the mountains," noise coming from the proposed range "will be reflected back to the west," toward State lands and "away from the residences and populations in the surrounding areas." The response proposed no new noise mitigation measures.

Third Notice of Incomplete Permit Application and Response

On June 6, 2022, Agency staff issued a third NIPA for the project. This third NIPA included requests for:

- An updated site map with all markings labeled that depicted and confirmed the size of the lease area, which remained unknown, and the dimensions and locations of the firing pad and target area, which appeared to have changed from the initial application;
- An updated noise impact evaluation comporting with the DEC Noise Policy, prepared by a NYS licensed professional, and including an explanation of the decrease in proposed maximum noise levels from 185 dB to 166.1 dB;
- An explanation of the assumed ambient noise level of 80 dB at the site and the Pulsifer residence;
- Clarification of the procedures for public notification of tests;
- Inclusion of additional noise mitigation measures;
- Confirmation of the equipment and machinery proposed for use on site; and
- Clarification of numerous other discrepancies between submissions.

The third NIPA noted that "the proposal as presented consists of testing munitions year-round up to 120 times per year with an estimated munitions firing noise source of 185 dB with no noise source mitigation measures proposed," while the U.S. Department of the Army considers any impulse noise greater than 140 dB to be hazardous, and the US Bureau of Mining has documented damage to residential dwelling window glass from over air pressure blasts of greater than 133 dB.

On September 16, 2022, and November 9, 2022, the Agency received from H2H Associates, LLC (now H2H Geoscience Engineering, PLLC; referred to herein as H2H) an initial and revised Scope of Work proposal for performing a noise analysis at the project site. Staff responded to these letters on September 28, 2022, and November 28, 2022. The specific changes to the Scope of Work requested in staff's responses were later incorporated by H2H, though no final approval of the proposed Scope of Work was ever issued by staff.

On February 28, 2023, the Agency received a partial response to the third NIPA from Matthew Norfolk, Esq., as attorney for UCI, which was now described as the applicant. This response stated that the applicant was no longer proposing a lease subdivision, and would instead "have access to the area at certain times to perform ballistic testing in coordination with" the landowner.

In response to staff's request for clarification of the dimensions and locations of the firing pad and target area, the February 28, 2023, response stated that: "The specific placement of instrumentation and test articles will vary within a general range based on test requirements. All instrumentation and test articles are portable and will be emplaced before and after each test. As no permanent structures will be deployed, exact position of placement may vary each time."

In response to staff's request for confirmation as to the equipment and machinery proposed for use on site, the February 28, 2023, response declined to name any specifics, instead stating only that "all vehicles and equipment used on site will not exceed current noise levels created by" vehicles commonly used in sawmill operations. In response to staff's request for clarification of the procedures for public notification of tests, the response stated that, seven days prior to any test, UCI would notify the Town and mail notice to landowners "within a two-mile radius."

On March 1, 2023, the Agency received a document titled "Sound Study Unconventional Concepts, Inc. APA Project #2021-0276," prepared by H2H, and dated February 2023 (February 2023 Sound Study). The Project Background section introducing the February 2023 Sound Study included an explanation of the proposed testing process: "Each test will consist of four-five shots, and each series of shots will last no more than two days. Testing will only occur on weekdays, between 10:00 AM and 4:00 PM local time. No more than two shots will be fired in one day... The Sound Source (system being tested) will be located on a 100 ft. X 100 ft. crushed gravel pad (Firing Pad)... The Target Area is 590 ft. east of the Firing Pad."

The February 2023 Sound Study updated the specific weapon proposed for firing at the project site: an M109A3GN (155 mm) Howitzer. The February 2023 Sound Study also clarified for the first time some of the additional equipment proposed for use: a 40-ton haul truck for transporting the howitzer and other materials to and from and across the site.

The February 2023 Sound Study named 176 dB(A) as the noise level for the howitzer, stating that this "sound level data for the Sound Source is provided in" an older study, titled "Noise emission data for M109, 155 mm field howitzer," prepared by Morten Huseby for the Norwegian Defence Research Establishment, and dated December 5, 2007 (the 2007 Norwegian Study). The 2007 Norwegian Study, which was included with the materials received on March 1, 2023, examined the firing of M109, 155 mm field howitzers with a charge of up to 5 modules DM72, with each module containing 2.44 kilograms propelling charge.

The 2007 Norwegian Study was "conducted at the Norwegian Defence Research Establishment… to estimate noise pollution around military firing ranges." The study stated that the "M109 [Howitzer] is one of the noisiest weapons in the Norwegian defence, and as such represents a limiting factor for activity at firing ranges and training fields." The Study also repeatedly stated that, to the author's knowledge, there existed no "consensus" or "commonly accepted methods" for producing free field emission data to use for analyzing potential sound impact levels from howitzers.

Using 176 dB(A) as the noise source, the February 2023 Sound Study modeled impulse sound levels at five receptors within two miles of the project site: Receptors M-1, M-2, and M-3 located along residential lands to the east and south of the site, and Receptors M-4 and M-5 located on State lands to the west and northeast of the site. The modeled impulse sound levels were calculated as 75, 71, and 73 dB(A) at Receptors M-1, M-2, and M-3; 79 dB(A) at Receptor M-4; and 107 dB(A) at Receptor M-5.

As part of the February 2023 Sound Study, H2H also recorded and modeled ambient noise levels at the receptor sites, and then charted the difference between the ambient sound levels and the modeled impulse sound levels. The study modeled the impulse noise as being between 17.8 dB(A) and 72.3 dB(A) higher than the ambient noise levels.

Finally, the February 2023 Sound Study analyzed the overall change in ambient sound levels that would occur during the six-hour period from 10am to 4pm on a day with two shots fired. This modeling found that, because the impulse noises were so short, the increase in overall ambient noise levels over the six-hour period ranged from 0 to 0.4 dB(A) at Receptors M-1 through M-3, and from 2.0 to 32.0 at Receptors M-4 and M-5. The Study then found that "the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area."

The February 2023 Sound Study included an overlay of an aerial photograph, labeled Figure 1 – Site Overview Map. Figure 1 is scaled at 1 inch : 1,000 feet, and shows the region of the project site and approximate locations of the firing pad, howitzer, target, and property lines.

The February 2023 Sound Study was not signed by an engineer or any other New York State licensed professional.

Fourth Notice of Incomplete Permit Application and Response

On March 16, 2023, Agency staff issued a fourth NIPA for the project. This fourth NIPA included requests for:

- A revised noise impact evaluation that complies with the DEC Noise Policy, clarifies and documents the method for determining 176 dB(A) as the accurate noise source level for the howitzer, clarifies and documents the modeling used

for sound levels at the receptor sites, and clarifies numerous facts and other discrepancies among the prior submissions, including between the number of shots proposed for each test and the proposed charge for each test; and

- Confirmation of the equipment proposed for use at the site, noting that an "armored tracked vehicle" was documented as transporting the howitzer in the 2007 Norwegian Study.

The fourth NIPA also stated that, "until an acceptable full noise assessment has been provided, the Agency cannot assess whether the currently proposed public notification and mitigation is adequate."

At the applicant's request, on June 26, 2023, Agency staff attended a meeting with the applicant to discuss the fourth NIPA. On August 1, 2023, the Agency received from UCI a partial response to the fourth NIPA. In response to staff's questions regarding the noise source level for the proposed howitzer and the modeling used for sound levels at the receptor sites, the UCI response noted that the applicant had been required "to develop data that could be used to model the attenuation of sound produced by a howitzer due to the previous lack of available information."

In response to staff's request for confirmation of the equipment proposed for use at the site, the August 1, 2023, UCI response reiterated the applicant's earlier assertion that only "a diesel truck similar to what has historically operated on site in support of logging activities will be used to transport the" howitzer around the site. In response to staff's request for clarification of the number of shots proposed for each test, the response stated that no more than two shots are proposed for any given day, with up to three days of shots associated with each test. Finally, in response to staff's question regarding the maximum proposed charge, the response asserted that "the level of sound for all charge sizes employed will not exceed those acceptable levels determined by H2H's assessments and testing." The response concluded that "there are no other practicable means to mitigate noise."

The August 1, 2023, UCI response stated that "the Source sound power level was transcribed incorrectly in the H2H February 2023 Sound Study Report. Source sound power level is 180.8 dB (163.2 dB(A)), not 175.9 dB."

An updated Sound Study, prepared by H2H, dated July 2023, and included with the partial response (the July 2023 Sound Study), explained that the 180.8 dB sound power level was determined by using a Table in the 2007 Norwegian Study that documented a sound pressure level of 130.5 dB at a sensor located 803 feet away and at a 32-degree angle from a howitzer. There is no indication of variables such as terrain, vegetation, or wind and temperature conditions at the time of firing in the 2007 Norwegian Study. Nevertheless, using "industry standard calculations," the applicant used its own model to calculate back to determine the originating sound pressure level for the howitzer in the Norwegian study, and then determined that the sound level would be 127 dB at this same distance and angle from a howitzer on the project site. The July 2023 Sound

Study then asserted that the difference of 3.5 dB between the 130.5 dB recorded sound pressure reading in the Norwegian study and the applicant's modeled sound pressure reading of 127 dB showed "correlation within ISO standards." Therefore, according to the applicant, a level of 180.8 dB at the location of the howitzer should be considered accurate.

The July 2023 Sound Study was not signed by an engineer or any other New York State licensed professional.

On August 16, 2023, Agency staff issued a letter confirming receipt of the August 1, 2023, response, and noting that the Sound Study had not been sufficiently updated as requested and that the response had not confirmed the maximum charge proposed. The letter noted that, using the applicant's modeled potential error discrepancy of 3.5 dB, the application documented a potential for impulse noise levels at nearby State lands above the 133-dB level determined capable of breaking windows as documented by the US Bureau of Mining.

On December 15, 2023, the Agency received from UCI an additional response to the fourth NIPA. For the first time in the application process, this additional response proposed a noise mitigation measure that did not rely on the natural features of the site or notification to nearby landowners: the applicant now proposed to install a "Sound Mitigation Berm" on the site. The response stated that the berm would be 13 feet in height and "constructed along the northern boundary of the Firing Pad," but gave no specifics on the materials that would be used for construction or the location of the berm in relation to the howitzer. The December 15, 2023, UCI response also included modeling of sound levels by temperature and humidity, noting that "testing is not anticipated to take place" at lower temperatures, as well as additional sound power level and sound pressure level calculations, charts, and conclusions.

An updated Sound Study, prepared by H2H and dated September 2023 (the September 2023 Sound Study), was included with the materials received on December 15, 2023. The September 2023 Sound Study modeled impulse sound levels at Receptors M-1 through M-5 with and without the berm, although the study did not contain the modeling of sound levels by temperature and humidity or the additional sound power level and sound pressure level calculations, charts, and conclusions submitted with the UCI response.

The September 2023 Sound Study included a new color-coded model of sound pressure levels. This model is labeled "Image 1," and is described by the September 2023 Sound Study as "demonstrat[ing] the accuracy of the sound propagation model." "Image 1" appears to be an overlay of an aerial photograph of the site, although the locations of the firing pad, howitzer, target, and property lines are not visible. The September 2023 Sound Study also included the aerial photograph overlay labeled Figure 1 – Site Overview Map that had been included with the prior sound studies; this map shows the region of the project site with the locations of the firing pad, howitzer,

target, and property lines approximated, but without the color-coded sound pressure level modeling distinct to "Image 1."

The September 2023 Sound Study was not signed by an engineer or any other New York State licensed professional.

On January 2, 2024, Agency staff issued a fifth NIPA for the project. On January 18, 2024, the Agency received a request for an extension to the deadline for filing an appeal of the fifth NIPA pursuant to 9 NYCRR § 572.22(c). On January 18, 2024, staff responded by letter agreeing to the extension. On February 29, 2024, the Agency received the applicant's appeal of the fifth NIPA.

Appeal

Pages 1-12 of the appeal contain a summary by the applicant of the history of project submissions and Agency staff responses regarding the proposed firing range. Staff disagree with a number of the factual and other statements made in this summary. The applicant's summary, along with all other submissions and staff correspondence, are part of the record for this appeal.

The matter presented for review and action by the Agency members at this time is a challenge to the questions included by staff in the fifth NIPA. However, staff analysis of new information included in the appeal indicates that the application now contains sufficient information to allow for analysis of the proposal in relation to Questions 3 and 5. Accordingly, the remaining challenges to the fifth NIPA involve Questions 1, 2, 4, 6, 7, 8, and 9.

Responses Considered Sufficient

- Question 3 of the fifth NIPA

Since receipt of the initial application on November 21, 2021, the applicant's submissions have provided incomplete and conflicting information regarding the impulse noise level and location of proposed noise source. The maximum impulse noise level was stated as 180 dB in the initial application on November 21, 2021, 185 dB in the response to the first NIPA, 185 dB and then 166.1 dB in response to the second NIPA, 176 dB(A) in response to the third NIPA, and 180.8 dB (163.2 dB(A)) in response to the fourth NIPA. The proposed size and location of the firing pad has also been inconsistent throughout the applicant's submissions. Staff have continually noted that, due to the potential for impacts based on the impulse noise level and location of proposed noise source, additional noise mitigation measures may be required.

Until December 15, 2023, the applicant's responses to these comments regarding mitigation centered on the mitigation measures described in the initial application: that notification to nearby landowners of upcoming tests would not cause hearing damage or

increase anxiety or stress in nearby residents, and that the natural features of the site would reflect noise away from residences and towards uninhabited State lands to the west. On December 15, 2023, in a response to the fourth NIPA, the applicant proposed installing a berm as a new mitigation measure.

Question 3 of the fifth NIPA recommended additional potential mitigation measures, and requested an evaluation of whether any could be added to further limit noise impacts from the proposal. The applicant responded to this question on page 15 of the appeal, explaining that these additional measures would be unacceptable.

For the purpose of commencing review, staff have no additional questions regarding this issue. The applicant's response, along with staff's technical review and analysis, will be included as part of the permit application for future Agency review.

- Question 5 of the fifth NIPA

Since receipt of the initial application on November 21, 2021, the applicant's submissions have provided incomplete and conflicting information regarding the proposed timing and number of shots. Specifically, the initial application stated that there would be an average of 30 total shots per year under the proposal, but according to later submissions, there would be up to 10 shots per month, year-round. In addition, the applicant's December 15, 2023, written response suggested that no testing would occur at times of the year with lower temperatures, despite earlier indications that testing would occur in all months.

Question 5 of the fifth NIPA requested confirmation of the proposed maximum number of shots per week, month, and year, and whether there were any atmospheric conditions under which testing would not occur. The applicant responded to this question on pages 16-17 of the appeal, confirming that testing is proposed to occur year-round, with a maximum of 10 shots per month, and with no atmospheric restrictions.

For the purpose of commencing review, staff have no additional questions regarding this issue. The applicant's response, along with staff's technical review and analysis, will be included as part of the permit application for future Agency review.

Questions Remaining

- Question 1 of the fifth NIPA

Since receipt of the initial application on November 21, 2021, the applicant's submissions have provided incomplete and conflicting information regarding the proposed location of the noise source and the distance between the noise source and the private and State land receptor sites used in the noise analysis. As noted in the first paragraph of Question 1 of the fifth NIPA, in a submission received on February 28,

2023, the applicant stated that the location and distance would vary from test to test: "The specific placement of instrumentation and test articles will vary within a general range based on test requirements. All instrumentation and test articles are portable and will be emplaced before and after each test. As no permanent structures will be deployed, exact position of placement may vary each time." Noise impact evaluations depend on calculations using precise locations and distances; accordingly, the exact locations and distances must either be confirmed and used in the noise analysis, or the analysis must account for the worst-case-scenario for these factors.

> Staff request: *"Please provide cross-section sheet(s) depicting the proposed typical M109 155 mm howitzer and assembly set up to be utilized on site, including all proposed instrumentation and test articles, that is drawn to scale and depicts howitzer barrel and assembly dimensions and muzzle location. Please label the location of the noise source and its associated sound pressure level source height as measured from the finished grade of the pad."*

This request attempts to document the size of the proposed howitzer in face view. In particular, the requested sheet(s) would document the distance of the muzzle – which was the noise source location used in the 2007 Norwegian Study – from the rest of the artillery, and the height of the muzzle from the ground or firing pad.

> Staff request: *"To allow for review of worst-case scenario noise impacts, please provide scaled cross-section plan sheet(s) depicting the distance between the closest point of the proposed gravel pad or the noise source, whichever is closer, to each of M1-M5, and between the closest point of the proposed gravel pad and the receptor located at the southwest corner of the nearest state land parcel. Please depict the proposed berm on each of these plan sheets."*

This request attempts to document the location of the proposed howitzer in plan view. In particular, the requested sheet(s) would document and confirm the distance of the noise source from the receptor sites used in the noise impact evaluation. In addition, as the only indication in the record of the location for the proposed berm is that it would be "constructed along the northern boundary of the Firing Pad," this request also requires a scaled depiction of the berm in plan view.

The appeal states that "previous submissions" show that the "howitzer barrel assembly" will be "located in the center of the 100-foot by 100-foot firing pad;" however, a search of the record by staff finds no evidence that this information has been previously submitted. The appeal also supplies calculations not previously in the record purporting to model sound pressure levels at Receptors M-1 through M-5 with the sound source at "the edge of the firing pad;" however, these calculations were not provided and stamped by a NYS-licensed engineer and, in any event, do not account for the possibility of the noise source extending beyond the edge of the pad toward the receptor sites. Finally, the appeal points to the fact that the H2H Sound Studies use "a Sound Source height of

6.5 feet;" however, there remains no documentation in the record that 6.5 feet is or will be the accurate height of the noise source from the ground or firing pad.

As noise impact evaluations depend on calculations using precise locations and distances, the exact locations and distances must either be confirmed and used in the noise analysis, or the analysis must account for the worst-case-scenario for these factors. Therefore, given the importance of documenting and confirming the exact location of the proposed noise source in relation to the receptor sites, staff request that the Agency members affirm the need for the plan sheets requested in Question 1 of the fifth NIPA.

- Question 2 of the fifth NIPA

  Staff request: *"Please clarify what materials the berm will be constructed with, and any associated stabilization measures and other erosion and sediment controls."*

Despite numerous requests and suggestions for potential noise mitigation measures, no on-site mitigation was proposed until December 15, 2023, in the additional response to the fourth NIPA, when the applicant proposed installation of a berm "along the northern boundary of the Firing Pad." The record contains no specifics on the materials that would be used for construction, the location of the berm in relation to the noise source, or even whether the berm would be permanent or temporary and subject to movement or re-construction for individual tests.

As noted in the DEC Noise Policy, installation of a berm can be helpful in reducing potential noise impacts. However, any reduction in noise would depend on the type, size, and location of the berm in relation to the noise source; these factors must be known to allow for calculations of the angle of reflection and barrier attenuation. In addition, stabilization measures and erosion and sediment controls are sometimes necessary to protect nearby resources from berms, depending on the materials and method used for construction.

Given the importance of documenting the details related to the proposed berm, staff request that the Agency members affirm the need for the information requested in Question 2 of the fifth NIPA.

- Question 4 of the fifth NIPA

  Staff request: *"Please explain why there are separate tables, calculations and conclusions made in the UCI written response received on December 7, 2023, that are not included in the [September 2023 Sound Study by H2H]."*

UCI's December 15, 2023, additional response to the fourth NIPA included modeling of sound levels by temperature and humidity and other sound power level and sound

pressure level calculations, charts, and conclusions that are not included or reflected in the September 2023 Sound Study completed by H2H. Question 4 of the fifth NIPA attempts to reconcile these differences, to ensure that the record for Agency review and decision reflects consensus on the final proposal and modeled impacts.

Given the importance of documenting the details related to potential noise impacts, staff request that the Agency members affirm the need for the information requested in Question 4 of the fifth NIPA.

- Question 6 of the fifth NIPA

  Staff request: *"Please revise Image 1 to depict the location of the 100-foot by 100-foot pad, all state land boundaries, the southwest corner of the nearest state land parcel located approximately 300 feet from the northeast corner of the firing pad, the nearest dwellings (including the Pulsifer residence), receptor locations M1 – M4, and the closest point of the proposed gravel pad or the noise source, whichever is closer, to each receptor."*

H2H's September 2023 Sound Study modeled impulse sound levels at Receptors M-1 through M-5 with and without the berm. The study then asserted that "the accuracy of th[is] sound propagation model" was demonstrated in "Image 1."

"Image 1" is a color-coded model of sound pressure levels that was first submitted to the Agency with the September 2023 Sound Study, received on December 15, 2023. "Image 1" appears to be an overlay of an aerial photograph of the site; the locations of the firing pad, howitzer, target, and property lines are illegibly hidden beneath the color-coding of sound pressure levels.

In the appeal, the applicant states that Question 6 has been "asked and answered," because "UCI has already supplied Agency Staff with the requested information in Figure 1, 'Site Overview Map,' provided in H2H's September 2023 Sound Study." However, while Figure 1 in the September 2023 Sound Study does approximate the locations of the firing pad, howitzer, target, and property lines on an aerial photograph, Figure 1 does not contain the color-coded sound pressure level modeling distinct to "Image 1."

Given the importance of documenting the accuracy of the sound propagation model used in the sound studies in the record and the applicant's insistence that "Image 1" provides this documentation, staff request that the Agency members affirm the need for the revision to "Image 1" requested in Question 6 of the fifth NIPA.

- Question 7 of the fifth NIPA

In response to the request in the fourth NIPA for information as to how the decibel level of the noise source was determined by the applicant, the July 2023 Sound Study and

the September 2023 Sound Study both state that the level was calculated using a Table in the 2007 Norwegian Study. Specifically, the sound studies explain that this table showed a documented sound pressure level of 130.5 dB at a sensor located 803 feet away and at a 32-degree angle from a howitzer. There is no indication of variables such as terrain, vegetation, or wind and temperature conditions at the time of firing in the 2007 Norwegian Study. Nevertheless, using "industry standard calculations," the applicant used its own model to calculate back to determine the originating sound pressure level for the howitzer in the Norwegian study, and then determined that the sound level would be 127 dB at this same distance and angle from a howitzer on the project site. The July 2023 Sound Study then asserted that the difference of 3.5 dB between the 130.5 dB recorded sound pressure reading in the Norwegian study and the applicant's modeled sound pressure reading of 127 dB showed "correlation within ISO standards." Therefore, according to the applicant's response to the fourth NIPA, a sound power level of 180.8 dB at the location of the howitzer should be considered accurate.

> Staff request: *"Please provide an explanation of these ISO standards and the asserted correlation, including a clarification of whether the ISO standards are appropriately used in this context. Please also provide any other available documentation confirming that 3.5 dB is appropriately cited as the maximum limit of error for this proposal.*
>
> *Please confirm through field-verification at an authorized location and through independent third party verifications that 180.8 dB is the noise level produced by M109 155 mm howitzers."*

The DEC Noise Policy requires determining the maximum amount of sound created at a noise source, and then conducting a noise impact evaluation based on this level. Accordingly, it is imperative that the noise level of a noise source is accurately determined, to allow for analysis of potential impacts at receptor locations.

Question 7 of the fifth NIPA requests confirmation of the accuracy of the applicant's assertion of 180.8 dB as the noise level of an M109 155 mm howitzer. Staff remain concerned about the accuracy of this number for several reasons: every prior submission posited a different decibel level for the noise source; the 180.8 dB figure was calculated based a single measurement from one study in 2007 conducted in unknown conditions and with other unknown variables; the only confirmation of the accuracy of the applicant's calculation is based on their finding of a noise level 3.5 decibels lower than was documented in the 2007 Norwegian Study when the distance and angle of the 2007 measurement were inputted in the applicant's model; and the applicant asserts that a discrepancy of 3.5 decibels "show[s] correlation with ISO standards," where ISO standards have not been used in relation to other recent commercial and mining projects within the Park.

Given the importance of documenting the accuracy of the noise level of the noise source used in the sound studies in the record, staff request that the Agency members affirm the need for the information requested in Question 6 of the fifth NIPA.

- Question 8 of the fifth NIPA

  Staff request: *"The 'Noise emission data for M109, 155 mm field howitzer' study referenced in the [December 2023 Sound Study] references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency [on] July 18, 2022 reference the sound level for a M4A2 zone 7 charge. Please confirm that this will be the maximum charge used. Please also explain how the two charges compare and the effect [the charge] will have on the level of sound produced."*

UCI's May 12, 2022, submission to the Agency in response to the second NIPA described the noise source for the project as M4A2 zone 7 charges. However, the 2007 Norwegian Study, which was submitted on March 1, 2023, in response to the third NIPA and was used to model the decibel level of the proposed noise source for the H2H Sound Studies, involved a charge of up to 5 modules DM72, with each module containing 2.44 kilograms propelling charge.

The charge used in a howitzer may significantly alter the impulse noise level produced from firing. Accordingly, Question 8 of the fifth NIPA was first asked in the fourth NIPA, in response to the differing charges proposed after the second and third NIPAs. UCI's response to the fourth NIPA stated only that "the level of sound for all charge sizes employed will not exceed those acceptable levels determined by H2H's assessments and testing."

Given the importance of confirming that the maximum charge proposed will not result in impulse noise levels above the levels used in the sound studies in the record, staff request that the Agency members affirm the need for the information requested in Question 8 of the fifth NIPA.

- Question 9 of the fifth NIPA

  Staff request: *"Please provide an updated noise analysis that accounts for the confirmed height of the noise source from the gravel pad and the location of the noise source at the closest point of the gravel pad to each receptor. This updated noise analysis must include all tabular, calculated, and conclusory information included in the latest UCI response, Modal Data in Appendix D, and barrier attenuation calculations that account for the most conservative/worst case scenario height and location of the noise source in relation to each receptor. The updated noise analysis must also account for all proposed months of operation and any proposed atmospheric operating restrictions. In addition, the analysis*

must include revised tabular information, Modal Data in Appendix D, and barrier attenuation calculations that account for the height and location of the noise source in relation to each receptor, and must include sound pressure levels expressed as both dB and dBA. This updated analysis must include a cover sheet with the seal of a NYS licensed professional engineer."

Given the continuing inconsistencies in the record and the potential for impacts to Park resources from the proposal, staff request that the Agency members affirm the need for the updated noise impact evaluation requested in Question 9 of the fifth NIPA. In addition, as New York State professional standards require that projects involving the application of engineering principles and data be signed and stamped with the seal of a New York State licensed professional engineer, staff also request that the Agency members affirm the need for the updated noise impact evaluation to include a cover sheet with the appropriate seal.

Conclusion

For the reasons stated above, staff request that the Agency members affirm the need for responses to Questions 1, 2, 4, 6, 7, 8, and 9 of the NIPA.

Applicant Response

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NEW YORK STATE ADIRONDACK PARK AGENCY

In the Matter of APA Project No. 2021-0276,
Commercial Use – Ballistics Testing Facility
Project Sponsor: Michael Hopmeier of Unconventional Concepts, Inc.

REPLY MEMORANDUM IN SUPPORT OF PROJECT SPONSOR'S APPEAL OF FIFTH NOTICE OF INCOMPLETE APPLICATION

Please take notice that, pursuant to 9 NYCRR §572.22(a), Project Sponsor Michael Hopmeier of Unconventional Concepts, Inc. (hereinafter referred to as "UCI") submits this reply memorandum in support of its appeal of *Fifth Notice of Incomplete Application*, dated January 2, 2024 (hereinafter referred to as the 5th NIPA), an action taken by David J. Plante, Deputy Director of Regulatory Programs of New York State Adirondack Park Agency; and

Please take further notice that this appeal is being filed on behalf of UCI by the law firm of Norfolk Beier PLLC, with Matthew D. Norfolk, Esq. being of counsel, UCI's Authorized Representative herein.

Please take further notice that this appeal seeks a determination finding that: (1) all requests for information contained in the 5th NIPA are duplicative, unnecessary or moot as all information required for the project application to be complete has been submitted by UCI; (2) certain requests for information contained in the 5th NIPA are lacking relevancy to attaining a determination of application completion; (3) certain comments contained in the 5th NIPA must be stricken from the administrative record as they are based upon factual errors; (4) certain comments contained in the 5th NIPA must be stricken from the administrative record as they were made by Agency Staff in an unlawful attempt to issue a *de facto* denial of the application; (5) certain comments contained in the 5th NIPA must be stricken from the administrative record as they were made by Agency Staff in an unlawful attempt to alter or change the proposed project or use,

contrary to the intentions of UCI or prejudicial to UCI; (6) UCI's project application is complete; and, (7) pursuant to 9 NYCRR §572.22(h), providing notice of the completeness of the application as required by law and thereafter granting the permit application.

DECONSTRUCTING AGENCY STAFF'S OPPOSITION

Agency Staff's opposition memorandum, in large part, supports UCI's appeal and demonstrates the redundancy and arbitrary and capricious nature of the questions in its 5th NIPA. Agency Staff's responses to UCI's objections to each question contained in the 5th NIPA are discussed below, starting with Questions 3 and 5, which Agency Staff now deem to be fully answered.[1]

Question 3 of the 5th NIPA

Now, on appeal, Agency Staff deems Question 3 to be satisfactorily answered and no further response needed. Yet, no new information was provided by UCI in its initial appeal papers. UCI put forth its objections and merely stated no additional mitigation is needed, while pointing to its past submissions for support (*see* 1st NIPA response; p.5; 2nd NIPA response, p.4; Addendum to UCI's 2nd NIPA response, pp. 4-6; 3rd NIPA response, 6th p.; 4th NIPA response, p. 5; *see also* H2H Geoscience Engineering, PLLC September 2023 Sound Study submitted, p. 12 (September 2023). This is a prime example of Agency Staff's practice throughout the permit application process – requesting information previously provided.

[1] In its initial appeal papers, UCI collectively refers to Agency Staff's enumerated comments/questions contained in the NIPAs as "Comments." In opposition to UCI's appeal, Agency Staff refers to them as "Questions." To avoid confusion, herein UCI will also collectively refer to the enumerated comments/questions contained in the NIPAs as "Questions."

Question 5 of the 5th NIPA

Similar to how it responded to Question 3 on appeal, Agency Staff deems Question 5 to be satisfactorily answered and no further response needed. Quite telling, it concedes that UCI already answered the question. In its opposition, Agency Staff expressly states it was looking only for "*confirmation*" of an earlier response. Specifically, Agency Staff states in its opposition memorandum, at p. 14:

> **Question 5 of the fifth NIPA requested *confirmation* of the proposed maximum number of shots per week, month, and year, and whether there were any atmospheric conditions under which testing would not occur. The applicant responded to this question on pages 16-17 of the appeal, *confirming* that testing is proposed to occur year-round, with a maximum of 10 shots per month, and with no atmospheric restrictions.** [Emphasis added.]

UCI should not be required to confirm that which it already stated and submitted. Agency Staff has at its disposal the entire record. Additionally, Agency Staff's excuse for Question 5 is not sufficient. Applicants often change their proposed project and information associated therewith. Agency Staff is questioning the truth and veracity of UCI's submissions. This is not within the purview of Agency Staff's review of the application.

Question 1 of the 5th NIPA

The calculations and tabulations contained in UCI's objections to Question 1 provide the same information provided earlier to Agency Staff, just said in a different way, in another attempt to have Agency Staff understand the scientific data and technical information supporting the project application. To our knowledge, Agency Staff has not sought the assistance of a qualified expert for it to accurately interpret and understand information UCI has provided. This is so despite Executive Law §804 authorizing it to contract for professional and technical assistance and advice.

With respect to Agency Staff's claim that UCI has not provided the height of the sound source, this can be found on page 8 of the September 2023 Sound Study prepared by H2H Geoscience Engineering, PLLC ("H2H"). The September 2023 Sound Study was submitted to Agency Staff in response to a letter-request, dated August 16, 2023, from Mr. Fritz Aldinger, Agency Environmental Program Specialist 1. The September Sound Study, at p. 8, 1st paragraph, states, in pertinent part:

> **A receiver height of 5 feet, and *Sound Source height of 6.5 feet is used*. This field howitzer model is typical for its type and would represent the noisiest field howitzer tested on Site. The modeled scenario shows the M109A3GN firing from the Firing Pad (only location Sound Source will be operated) as shown on Figure 2. Appendix D summaries model input data.** [Emphasis added.]

It is disingenuous for Agency Staff to argue that the sound source height was not provided nor "used in noise analysis." (*See* Agency Staff Memorandum, p. 15, 1st ¶.) Again. it is not the applicant's responsibility to direct Agency Staff to a particular part of the record to see information already provided.

Turning to Agency Staff's claim that UCI never provided information regarding the sound source being in the center of the 100-foot by 100-foot firing pad, this is without merit. At the in-person meeting with Agency Staff on July 25, 2022, Mr. Hopmeier explained that the howitzer, the sound source, would be in the center of the pad.

Notwithstanding the foregoing, UCI's September 2023 Sound Study prepared by H2H states that the distances from the sound source (*i.e.*, the howitzer) to the sound receptors was measured from the firing pad. In other words, the measurements were from the edge of the firing pad closest to the sound receptor. Obviously, the edge of the square 100' x 100' firing pad is closer to a sound receptor than the center of the firing pad, a distance of 50'. This is a *de minimis* difference in distance regardless what sound receptor is used in the calculation. A qualified sound

engineer would know this. Nonetheless, the edge of the firing pad closets to any particular sound receptor is a distance less than that from the center of the pad resulting in a "worse case scenario," undefined standard Agency Stuff regularly uses.

But, it bears repeating. The distance between sound receptors measured from the center of the firing pad and the edge of the pad is *de minimis*. The closest sound receptor (Monitoring Location M5) is 504' from the edge of the firing pad and 554' from the center of the pad. *See* UCI's December 2023 submission. Thus, there is only a 9.9% difference in distance. The next closest sound receptor is 5,200' away (Monitoring Location M4). *See* December 2023 submission (response to the letter-request, dated August 16, 2023, form Fritz Aldinger Environmental Program Specialist 1). There is only a .01% difference in distance using the center of the firing pad compared to the edge of the pad. The percentage of the difference in distance from the center of the firing pad and edge of the pad for the remaining three (farther away) sound receptors (Monitoring Location M1 (5,905' from firing pad edge), M2 (9,875' from firing pad edge) and M3(7,676' from firing pad edge)) is obviously less – drastically less.

If Agency Staff employed the services of a qualified sound engineer, it would have concluded that the difference in distance to the sound receptors from the center of the firing pad and edge of the firing pad is *de minimis* and should not be a reason to reject H2H's sound study and nit-pick over where the sound source may or may not be on the firing pad.

Question 2 of the 5th NIPA

UCI stated it would construct a berm. A "berm" is defined "as a mound or wall of earth or sand." Merriam-Webster Dictionary. This is common knowledge. That is what UCI's proposed berm will be constructed with. For Agency Staff to ask what materials will be used to construct a berm would cause most reasonable persons' eyes to roll.

Notably, the Agency's own rules and regulations use the term "berm." *See* 9 NYCRR 578.8(i) ("Other regulated activities may introduce or increase toxins, noise and other forms of pollution, remove or reduce vegetation or expose soil to erosion. Such activities include, for example, the operation of all-terrain vehicles and airboats, construction of utilities in existing or new corridors, either overhead or underground, disposal of chemicals, introduction or discharge of pollutants, application of pesticides and other chemicals, disposal of solid wastes, clearcutting or other timber harvesting practices, and construction or removal of groins, bulkheads, *berms* or levies."[Emphasis added.]) The term "berm" is not defined in the Agency's regulations. The drafters did not include a definition presumably because none is needed. A berm is a berm – a mound of earth or soil or sand. It is unreasonable for Agency Staff to ask UCI to "clarify what materials the berms will be constructed with."

Furthermore, Agency Staff claims no information was provided as to the location of the berm. This is wrong. UCI expressly states where the berm will be located; that is, "along the northern boundary line of the Firing Pad." *See* UCI's response December 2023. Moreover, in "Figure -2 Site Map" of UCI's September 2023 Sound Study it depicts to scale in yellow, having a dog-leg left shape, the berm wrapping around the eastern and northern boundary of the firing pad. To be candid, this is a gross oversight by Agency Staff and causes UCI to again have much concern about Agency Staff's attention to detail, knowledge of the record and competency in interpreting basic maps.

Question 6 of the 5th NIPA

Deeming a permit application to be incomplete purportedly because an image or map has illegible markings or faint colors is an unreasonable basis, tiptoeing near misuse of statutory

authority. An email or telephone call from Agency Staff to the applicant or authorized representative would have resolved the issue.

In any event, Agency Staff is asking the Agency Board to affirm the need for a "revision to "Image 1." Such affirmation is not necessary. Image 1 provided by UCI is legible and easy to interpret. Notwithstanding this, UCI shall provide a new copy of Image 1

Question 7 of the 5th NIPA

Agency Staff's request for information in Question 7 of the 5th NIPA is a result of it not having qualified and able experts well-versed in the science and study of sound, whether in-house or through third-party contracts. Agency Staff is having difficulty understanding why UCI is employing International Organization of Standardization ("ISO") standards when, according to Agency Staff, "ISO standards have not been used in relation to other recent commercial and mining projects in the Park." *See* Agency Staff memorandum, p. 18. Agency Staff is effectively conceding it has no experience with ISO standards nor the method of their application. As a consequence, Agency Staff unabashedly requests UCI to explain what ISO standards are and why they exist and how they are interpreted and applied to UCI's studies. Question 7 states, in pertinent part, "[p]lease provide an explanation these ISO standards." UCI, as an applicant, has no obligation to explain to Agency Staff what ISO standards are nor how they are applied.

Moreover, without expertise in the field of sound science, Agency Staff cannot understand the 2007 Norwegian Study nor how UCI use it to measure the sound level at the sound source location (location of the howitzer) as explained in UCI's response to the 4th NIPA and prior submissions. Years into this application, Agency Staff is still asking for *confirmation* of the noise level produced by a howitzer.

Agency Staff must be educated in some manner not involving UCI. Agency Staff should have retained and should now retain a third party expert to assist it with UCI's application and certainly have the third party expert present the application to the Agency Board. UCI fears Agency Staff will not accurately present the science and data to the Board. UCI hereby requests an expert in the field of sound present the application to the Agency Board when the time comes for the Board to take action.

The remaining requests in Question 7 ask UCI to *confirm* that the information *already provided* to Agency Staff is accurate. In other words, Agency Staff is repeating a request for information which it already possesses. UCI's response to Question 7 of the 5th NIPA is complete.

Question 8 of the 5th NIPA

Agency Staff baldly asserts that "[t]he charge used in a howitzer may significantly alter the impose noise level produced from firing. *See* Agency Staff memorandum, p. 19. Agency Staff cites no source or authority supporting its conclusion. Agency Staff should be required at oral presentation to explain how it arrived at this conclusion.

Agency Staff is obligated to accept UCI's response to the 4th NIPA where it states the charges used will not exceed the maximum sound level to be produced when the howitzer is fired. It has offered no coherent basis to reject the answer. If Agency Staff had the assistance of an audible engineer it would understand UCI's position.

Question 9 of the 5th NPIA

Agency Staff is requesting another sound study to provide a "worse case scenario," whatever that means, accounting for the height and location of the sound source. UCI has already done this with the September 2023 Sound Study. Measurements were based on the edges of the firing pad and a 6.5 feet sound source (barrel) height. Agency Staff desires UCI to state it again. A qualified audio engineer retained by Agency Staff would not have required this.

Agency Staff's Repeated Request for Engineered Stamped Data

As an initial matter, Agency Staff knows very well that the data provided by UCI has been generated by New York State licensed professional audible engineers, H2H. Moreover, to date Agency Staff has accepted all studies conducted and data offered by H2H, and based all of its NIPAs on the H2H studies and data. Agency Staff is desperately searching for something to support its 5th NIPA.

Notwithstanding the foregoing, UCI shall submit the studies and data again signed and stamped by an engineer from H2H. With this commitment, Agency Staff's request is moot.

CONCLUSION

UCI has supplied to Agency Staff extensive scientific data supporting a finding that UCI's proposed project (i) will be quieter on surrounding environments than noise generated by the nearby mining operations during blasting, (ii) will create a combined impulse noise event of *7.5 seconds over a five-year period*, and (iii) does not pose a potentially significant environmental impact due to an increase in sound levels in surrounding land, including those designated Wild Forest. Nothing more is needed from UCI. And, UCI will produce studies and data signed and stamped by a licensed professional engineer from H2H as requested. Accordingly, the application should be deemed complete, or at least so contingent on stamped studies and data.

Dated: May 15, 2024

Norfolk Beier PLLC



By: _____
Matthew D. Norfolk, Esq.
Authorized Representative

To: Chairman John Ernst
Dan Wilt, Chair – Committee on Regulatory Programs
Barbara Rice, Executive Director
Sarah Reynolds, Esq., General Counsel
David Plant, Deputy Director for Regulatory Programs

May 2024 Agency Meeting Minutes
Denial of Applicant's Appeal

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Adirondack Park Agency
May MEETING MINUTES

Thursday, May 16, 2024

Agency Members, Designees, and Executive Staff Present:

John Ernst, Chairperson

Brad Austin, ESD
Mark Hall, Member
Art Lussi, Member
Ken Lynch, Member
Matt Tebo, Department of State
Dan Wilt, Member
Randy Young, NYS Department of Environmental Conservation

Barbara Rice, Executive Director
Damion Stodola, Counsel

Absent and Excused
Benita Law-Diao, Member
Zoë Smith, Member

Local Government Review Board Present
Gerald Delaney, Executive Director

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1. CALL TO ORDER and 2. WELCOMING REMARKS

The meeting was called to order at 9:32 AM. Chairperson Ernst welcomed the public and staff. Chairperson Ernst reported that the Open Space Institute recently celebrated its 50th anniversary where it honored founders and long-time staff member.

3. PUBLIC COMMENT

Kevin Bean, Supervisor, Town of Johnsburg, read the resolution issued by the Town of Johnsburg in support of Barton Mine after a unanimous vote. The permit for this is under review by the DEC and APA.

4. APPROVAL OF APRIL 18, 2024 AGENCY MEETING MINUTES

On motion of Mark Hall, seconded by John Ernst, the April minutes were, with the amendments noted below, unanimously approved with Randy Young abstaining.

- The second sentence regarding General Permit 2024G-1 indicating that John Ernst seconded the motion was removed because that information was already captured in the first sentence.
- The start time for the Regulatory Programs Committee minutes was changed from "1:30 PM" to "9:48 AM."
- The Regulatory Programs Committee minutes were changed from "(1)P2023-0038 –Horseshoe Pond and Deer River Flow Association (Aaron Ziemann) Aaron Ziemann, Associate Adirondack Park Project Analyst Forest Resources, gave a detailed overview and presentation of the project including review of jurisdiction, conclusions of law, a description and slides of the project location and the existing conditions, site history, proposed project details, visual analysis slides, public comment, review by others, and staff's recommendation and permit conditions" to
  "(1) P2023-0038 – Application for the use of herbicide ProcellaCOR EC in Horseshoe Pond and Deer River Flow Association (Aaron Ziemann) Aaron Ziemann, Associate Adirondack Park Project Analyst Forest Resources, gave a detailed overview and presentation of the project including review of jurisdiction, conclusions of law, a description and slides of the project location and the existing conditions, site history, proposed project details, visual analysis slides, public comment, review by others, and staff's recommendation and permit conditions."

5. RECUSALS

None

6. MOTION FOR EXECUTIVE SESSION

General Counsel Damion Stodola indicated an Executive Session would be appropriate to discuss ongoing and pending litigation. On motion of John Ernst, seconded by Mark Hall, the Agency Board unanimously voted to conduct an executive session for purposes of discussing ongoing and pending litigation.

7. EXECUTIVE DIRECTOR'S REPORT

Executive Director Barbara Rice presented the Executive Director Report, highlights of which included:

- Today is bike to workday, which we are re-naming Bike to Board day. Members and staff met up on the Adirondack Rail Trail to bicycle to the agency in time for the meeting.
- Executive Director Rice expressed condolences to the family, friends, and colleagues of Ranger Robbi Mecus, of the New York State Department of Environmental Conservation who passed away last month following a climbing accident in Alaska.
- Welcomed the first of four interns, Emily Pulcini, who will be interning in the GIS division working closely with Molly Jordan. In the next few weeks, we will be adding interns to our legal, science and economic divisions.
- Congratulations to Ariel Lynch on her promotion to Environmental Program Specialist 3. Ariel has been with the agency since 2007 and has most recently been our expert on the issue of cell towers within the Park.
- Our second Adirondack Planning Forum which took place last month at the Hotel Saranac, hosted 220 local government officials, Adirondack Park citizens, consultants and partner agency representatives. Executive Director Rice thanked Gerald Delaney for bringing his community voice to the welcoming address, and now-former Secretary of State Robert Rodriquez for speaking at our reception. Executive Director Rice also acknowledged the incredible effort that went into planning and executing this year's forum particularly by our Local Government Services staff Robyn Burgess and Kate-Lyn Knight.
- Governor Hochul announced big funding wins for Adirondack communities in this year's Smart Growth Grant Program Awards. 36 Adirondack Park projects netted over $4.3 million in funding to be put toward important projects like affordable housing, climate change mitigation, green energy infrastructure and community recreation.
- We welcomed students from Allendale Columbia School in Rochester and North Country Community College to the Agency last month where they learned about the Park and how the APA protects it. Staff, particularly Dave Plante, Deputy Director of Regulatory Programs, went out of their way to provide presentations

to these groups helping the next generation develop a stronger understanding of and connection to the Adirondack Park and our Mission.

- We joined regional agencies, organizations, and business for the first time at Adirondack Day last week, Keith McKeever, Megan Phillips and Ben Brosseau spent the day connecting with legislators and citizens through the legislative office building in Albany allowing for further opportunities for outreach and sharing of our mission with those that may not have engaged with us directly in the past.
- NYS Supreme Court, Appellate Division, Third Judicial Department made a unanimous four to zero decision in favor of the agency in the Lake George ProcellaCOR case. This decision reflected the thoughtful and thorough work completed by the staff and the Board's fair and science-based decision.
- In an effort to improve transparency staff have started a website revamp. We have started to review how we share information through our website and work through challenges utilizing data and best practices to re-align our structure with the content and make it easier to find the information that landowners, communities and other audience need.

8. MOTION TO ADJOURN INTO COMMITTEES

On motion of John Ernst, seconded by Art Lussi, the Agency Board unanimously voted to adjourn to committees at 9:52 AM

State Land Committee

The committee meeting convened at approximately 9:53 AM.

State Land Committee Members Present: Ken Lynch (Chair), Randy Young (DEC) and John Ernst.

Other Members and Designees Present

Brad Austin (ESD), Art Lussi, Matt Tebo (DOS), Dan Wilt

Local Government Review Board Present

Gerald Delaney, Executive Director

Agency Staff Present

Barb Rice, Damion Stodola, Megan Phillips, Kevin Prickett

(1) Planning Division Report (Megan Phillips)

Megan Phillips, Deputy Director for Planning provided an update on recent Planning Division activities to both the state land and park policy and planning committees, highlights of which included:

- The team is very lucky to have Emily Pulcini join the GIS team an intern.
- Congratulated Local Government Services staff, Robyn Burgess, and Kate-Lyn Knight on another successful Adirondack Planning Forum. Attendees also had an opportunity to meet with the North Country Economic Development Council and the Department of State to talk about opportunities in NY Forward and DRI programs.
- 42 Variance referrals have been processed by the Local Government Services team so far in 2024 from local Agency approved land use programs. Staff process approximately 100 variance referrals a year and typically only reverse 2-4 of those.
- There is a new funding opportunity to implement options for strategies for reducing road salt use. The DECs Water Quality Improvement Grant and the Non-Agricultural Non-Point Source Planning Grant opportunities are currently open and the deadline for applications is July 31 by 4:00 PM.
- The DEC released an advanced notice on potential rulemaking to solicit feedback on an update to the State's Water Quality Standards. This is the process by which the DEC will consider setting chloride standards for the protection of aquatic life.
- Phase 2 of the Rail Trail is now closed to the public while it is under construction. Phase 3 is currently out to bid with the bid opening scheduled for May 22, construction slated to start in July.

2. Cranberry Lake Campground Unit Management Plan Amendment (Oliver Miller, DEC, and Kevin Prickett, APA)

   Oliver Miller, Environmental Protection Specialist 1 at the NYS Department of Environmental Conservation presented the proposed plan for a draft amendment to the Unit Management Plan for the campground at Cranberry Lake to allow for the creation of a playground in space previously occupied by an amphitheater. Staff highlighted the multiple options for surfacing and location that were considered for the project.

   Kevin Prickett, Environmental Protection Specialist 2, shared applicable guidelines from the State Land Master Plan for this project, specifically those for intensive use areas and public campgrounds.

On a motion of John Ernst, seconded by Randy Young, the committee unanimously recommended this project be authorized for a joint comment period with DEC.

Old Business

None

New Business

None

Committee Adjourned at 10:27 AM

Park Policy & Planning Committee
The committee meeting convened at approximately 10:28 AM.

Park Policy & Planning Committee Members Present: John Ernst (stepping in for Chair, Benita Law-Diao), Mark Hall and Brad Austin (ESD)

Other Members and Designees Present

Art Lussi, Ken Lynch, Matt Tebo (DOS), Dan Wilt, Randy Young

Local Government Review Board Present

Gerald Delaney, Executive Director

Agency Staff Present

Barb Rice, Damion Stodola, Megan Phillips, Kevin Prickett

1. Housing in the Adirondacks
   Beth Gilles, Executive Director of Lake Champlain-Lake George Regional Planning Board and Crystal Loffler from the NYS Office of Homes and Community Renewal provided presentations of their work to assess housing needs within the region and grant programs available to provide funding in support of mitigating the existing housing shortages.

Old Business

None

New Business

None

Committee Adjourned at 11:34 AM

Executive Session/Lunch

Because no action was taken, no minutes of the executive session were required or taken.

Regulatory Programs Committee

The committee meeting convened at approximately 1:05 PM.

Regulatory Programs Committee Members Present:

Dan Wilt (Chair), Art Lussi, Ken Lynch, Matt Tebo (DOS)

Other Members and Designees Present:

Brad Austin (ESD), John Ernst, Mark Hall, Randy Young

Local Government Review Board

Gerald Delaney, Executive Director

Agency Staff Present:

Sarah Reynolds, Barb Rice, Damion Stodola, David Plante, Aaron Ziemann, John Burth

(1) Regulatory Programs Division Report (David Plante)

David Plante, Deputy Director of Regulatory Programs and Enforcement provided an update on recent Regulatory Programs activities, highlights of which included:

- As of April 30, 2024, 148 applications have been received which is an increase as compared to this time in 2024 by 44 applications.
- 73 permits have been issued which is less than the 82 issued in 2023 during the same time frame.
- 23 Major Projects have been deemed complete and submitted to the Environmental Notice Bulletin for public comment, which is on par with the 27 completion projects at this time in 2023.
- Lastly, 3 emergency permits/emergency recovery authorizations have been issued thus far in 2024.
- The application form for Commercial Solar Generation Facilities has been updated to include a checkbox for the landowner to allow us to track invasive species on their property and report infestations to iMapInvasives, requirements for additional information related to decommissioning, operations & maintenance plans, battery storage components (if applicable) and requirements for additional

threatened/endangered species and historic resources consultations, as well as a reference to the updated solar project section of the Development in the Adirondack Park (DAP) guidance document. The newly completed form has been uploaded to the Agency website for ease of access by the public.

(2) P2021-0276 – Michael Hopmeier, NIPA Appeal

Dan Wilt, as Chair of the Regulatory Programs Committee, called to order an appeal, pursuant to APA Regulation 572.22, asking the Committee to recommend to the full Board that it reject an action taken by Deputy Director of Regulatory Programs, David Plante, seeking additional information to review the permit application.

Chair Wilt identified the representatives, the time limits for their arguments, and indicated that he would then allow the full Board to ask questions of the representatives.

Matthew Norfolk, of Norfolk Beier PLLC represented the applicant and appellant in this matter, Michael Hopmeier of Unconventional Concepts, Inc. Sarah Reynolds, Associate Counsel for the APA, represented David Plante and his determination in issuing the Fifth Notice of Incompletely Permit Application.

Following the presentations, Chair Wilt opened the floor for questions.

Dan Wilt clarified that the appeal is separate from and did not require a decision on the applicant's permit as it was still not complete. The Agency will make a decision on the permit only after all preliminary steps have been completed. The only matter before the Committee today is the appeal of the Deputy Director's fifth notice of incomplete permit application.
Brad Austin, Randy Young, and Ken Lynch respectively asked questions concerning staff expertise and the agency's ability to hire outside experts; clarifications of the size of the charge used in the testing; and the number of shots proposed to be made in the application. Both Sarah Reynolds and Matthew Norfolk provided answers.
After a final call for questions and hearing none, on motion of Ken Lynch, seconded by Art Lussi, the Regulatory Programs Committee voted unanimously to recommend that the Board deny the appeal.

(3) P20220218 – USL Marina, LLC Permit for expansion of existing marina through installation of a new dock system on Fish Creek Pond.
John Burth, Environmental Program Specialist 3 provided a detailed overview and presentation of the permit application by USL Marina, LLC for expansion of the existing marina through installation of a new dock system on Fish Creek Pond. The presentation included a review of the jurisdiction, conclusions of law, a description of slides of the project location, existing condition, site history, proposed project details,

visual analysis slides, public comment, review by others, and staff recommendations and permit conditions.

On motion of Art Lussi, seconded by Matt Tebo, the committee unanimously recommended the approval of the applications with conditions to the Full Agency Board.

(4) P2024-0040 – Permit for application of herbicide ProcellaCOR EC within four treatment zones in East and West Caroga Lakes, to control Eurasian watermilfoil. Aaron Ziemann, Associate Adirondack Park Project Analyst – Forest Resources, gave a detailed overview and presentation of the application for the use of the herbicide ProcellaCOR EC within four treatment zones in East and West Caroga Lakes to control Eurasian watermilfoil, including review of jurisdiction, conclusions of law, a description and slides of the project location and existing conditions, site history, proposed project details, visual analysis slides, public comment, review by others, and staff's recommendations and permit conditions.

On motion of Art Lussi, and seconded by Ken Lynch, the committee unanimously voted to recommend the approval of the application to the Full Agency Board.

Old Business

None

New Business

None

The Board returned to Full Agency at 3:19 PM

9. Committee Reports

a) State Land Committee

The State Land Committee reported that they heard a presentation from DEC and APA staff recommending that a project at the Cranberry Lake DEC Campground which would require an amendment to the UMP for the construction of a playground. On the motion of Ken Lynch, and seconded by John Ernst, the committee unanimously voted to move this project forward toa period of public comment.

b) Park Policy and Planning

The Park Policy and Planning Committee reported that they received a presentation from the Lake Champlain-Lake George Regional Planning Board and the New York State Office of Homes and Community Renewal highlighting their work to assess housing needs within the region as well as grant opportunities that exist within the state for municipalities to help fund housing creation and rehabilitation of existing homes.

c) Regulatory Programs Committee

Chair Wilt reported that the Regulatory Programs Committee recommended the following actions to the full Board.

P2021-0276 – NIPA appeal. On the motion of Dan Wilt, and seconded Matt Tebo, the Board unanimously denied the applicant's appeal from Deputy Director David Plant's Fifth Notice of Incomplete Permit Application.

P2022-0218 – On the motion of Dan Wilt, and seconded by Art Lussi, the Board voted unanimously to approve this permit application from USL Marina for an expansion of the existing marina and new dock system with the noted conditions.

P2024-0040 –On the motion of Dan Wilt, seconded by John Ernst, the Board voted unanimously to approve this permit for application of the herbicide ProcellaCOR EC to locations in East and West Caroga Lakes with the noted conditions.

d) Local Government Review Board Report
Gerald Delaney APA staff that found the before and after ProcellaCOR video of Lake Luzerne that showed the efficacy of the herbicide on Eurasian watermilfoil.

10. Interim Reports

The Administration, Economic Affairs, Enforcement, Legal Affairs, Local Government Services, Park Ecology and Public Awareness committees did not meet this month.

11. Member Comment

None

12. Old Business

None

13. New Business

None

14. Public Comment

Chris Navitsky, Lake George Water Keeper, presented a statement to the Board in opposition of the use of ProcellaCOR EC for use in Lake George citing recent findings of the Minnesota Department of Agriculture which defined a degraded version of the active ingredient as a PFAS or “forever chemical.”

Claudia Braymer, Protect the Adirondacks!, expressed confusion regarding the jurisdictional threshold of a wetlands review as noted in the presentation for the expansion of the USL Marina on Fish Creek Pond. She also expressed her desire for an adjudicatory hearing on the use of ProcellaCOR.

James Monty spoke in support of the project in Lewis, NY being proposed by Michael Hopmeier/Unconventional Concepts, Inc. and criticized the APA for denying the permit. Damion Stodola, General Counsel, clarified for the commentator that the appeal that was heard today was not a determination of the merits of the permit, which remained incomplete. It was an appeal of a fifth Notice of Incomplete Permit Application (NIPA). The project itself has not been and cannot be decided upon until a complete application is received.

Shaun Gilliland, Supervisor of the Town of Willsboro and Essex County Board of Supervisors Chair also spoke in support of the project being proposed by Michael Hopmeier/Unconventional Concepts, Inc. and its importance for the safety of members of the armed forces.

Helena Rice spoke in objection to the use of ProcellaCOR on Lake George, specifically the area known as Sheep’s Meadow Bay.

[Link to video and audio recordings of the full Agency presentation to be added.]

Chairperson Ernst said that the next meeting will be June 20-21, 2024.

The meeting was adjourned without objection at approximately 4:08 pm.

John Ernst

John Ernst, Chairperson

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5th NIPA Responses

918

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: June 20, 2025

New York State Adirondack Park Agency

KATHY HOCHUL
Governor

BARBARA RICE
Executive Director

FIFTH NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

REQUESTED INFORMATION
APA Project No. 2021-0276

Please submit your response to this Notice by email to frederick.aldinger@apa.ny.gov. All application submissions should be in PDF or similar format and be legible. Electronic copies of plans must be fully scalable.

April 16, 2025

Before addressing each of Staff's requests or comments, to assist Staff in its analysis of Applicant's ("UCI") response to the APA's Fifth Notice of Incomplete Application ("NIPA"), below is a summary and clarification on key aspects of the project Staff has raised concerns over as being inconsistent.

While a number of issues have been raised during this process, ranging from operational impact on the environment to commercial versus urban use of the site, the entire issue appears to have been reduced to one of noise. Our information and point of view can be summarized as follows:

- We are generating less noise (over a five-year period, only 7 and ½ seconds of impulse noise) than sources ranging from chainsaws to an active mine site less than a mile away. The noise to be generated is equivalent to or less than that of a hunting firearm at any of the receptor sites.
- The APA has already approved and sanctioned greater noise generators than proposed here, closer to more sensitive areas, so there is precedent for our approval as we are below the impact of existing permits already issued.

- We have demonstrated, through extensive modeling, analysis and world recognized and accepted methods and research institutions that our presented data is well below any regulatory defined maximums and numerous experts have validated such.
- While Staff and UCI may not agree with regulatory and legislative processes for assessing noise and environmental impact, we have nonetheless followed those processes (specifically NYS DEC and other State mandated procedures and guidance) for determination of data provided. Further analyses, beyond those mandated, merely add to costs, delays and negatively impact the local community as well as the National Security of the United States.

We have gone to great effort to cooperate with Staff and address their concerns and hope this issue can be resolved in the near future.

With regard to responding to the specifics of the NIPA, we respectfully provide the following.

First, there are concerns that the noise level of the sound source has changed throughout the application process. Initially, UCI's application only specified that the range would be used to develop and assess the internal ballistics of various kinetic systems used by the US military to determine the effectiveness of various approaches and techniques used in the manufacturing of cannon barrels. UCI believed it was unnecessary to disclose the exact model of cannon barrel to be tested due, in part, to misplaced negative connotations associated with large caliber military weapons. UCI in subsequent submissions to Staff specified that the intended cannon barrel for testing will be the assembly for 155 mm Howitzers.

Below is a breakdown of how the projected noise level "changed" from the filing of application to present:

- 180 dB (Application p.28)
- 185 dB (Response to 1st NIPA pp. 3, 4) – maximum based on US Amy publication for any Howitzer (not just the type to be tested)
- 183 dB (Response to 1st NIPA p. 4) – applicable to the 155mm howitzer barrel assembly to be tested
- 185 dB (Response to 2nd NIPA) – revised at Staff's request to the higher reported noise level.
- 166.1 dB(A) (Response to supplement to 2nd NIPA p. 3) – revised based on US Army publication for the howitzer assembly to be fired. First time using A-weighted decibels.
- 176 dB(A) (February Sound Study p. 63) – This number was typed in error.
- 180.8 dB / 163.2 dB(A) (Reply to 4th NIPA p. 3) – revised as February Sound Study had transcription error.
- 180.8 dB / 163.2 dB(A) (September Sound Study).

Second, the location and height of the sound source has remained the same throughout the application process. Although, it is apparent that UCI's written submissions had not clearly identified the exact location of the sound source. The sound source, which will be the subject of testing, will be and always remain at the center of the firing pad. UCI will not conduct tests outside the center of the pad. Moreover, the location of the receptors and that of the sound source have not changed in the sound propagation model. The distance from the sound source to each monitoring location listed in Section 3.3 of each sound study is an approximate distance from the receptors to the sound source. The sound propagation calculations use a more exact scale and the distance between each receptor from the sound source is referenced directly from the exported sound propagation model results (Appendix F). *See* Table 1 for the variations in distance.

Table 1: Change in Distance from Receptor to Center of Firing Pad Throughout Submissions

Receptor	Location	Sound Study [Sec. 3.3] (ft.)	Sound Study [Appendix F] (m.)	Dec. 2023 Response (ft.)	Difference (ft.)
M-1	Residential Receptor R-1	5,800	1,815.25	5,955	+155
M-2	Residential Receptor R-42	9,500	3,025.51	9,925	+425
M-3	Along Route 9	7,700	2,355.21	7,726	+26
M-4	Wild Forest land to Southwest	5,200	1,496.32	4,908	-292
M-5	Wild Forest land to Northeast	510	169.84	554	+44

Third, all supplied sound studies have identified the height of the sound source as 6.6 feet (2 meters). UCI will not change the height over the course of the tests – this is fixed.

Lastly, with respect to the calculated sound pressure levels, below is a chart (Table 2 below) detailing the highest noise pressure level calculated (in dB(A)) in each UCI response, with an explanation of the changes.

Table 2: Change in Calculated Sound Pressure Levels in Submissions.

Receptor	Feb. 2023 Sound Study	Sept. 2023 Sound Study	Sept. 2023 Sound Study	Dec. 2023 Response	Dec. 2023 Response	Dec. 2023 Response
	Table 1[1]	Table 2a[1]	Table 2a[2]	Table 1[2+]	Table 2[1*]	page 3[2]
M-1	75	75	67	67	90	N/A
M-2	71	71	71	71	86	N/A
M-3	73	73	73	73	88	N/A
M-4	79	79	79	79	92	N/A
M-5	107	107	100	100	111	100
State Land Corner[3]	N/A	N/A	N/A	N/A	N/A	102

[1] Without Sound Mitigation Berm
[2] With Sound Mitigation Berm
[3] Added to address APA comment
* Calculated using hemispherical straight line attenuation method
[+] Includes temperature and humidity variables

In summary, below are the calculated sound pressure levels for the project based upon the following parameters:

- Sound Source Noise Level: 180.8 dB / 163.2 dB(A)
- Sound Source Height: 6.6 ft. / 2 m
- Receptor Height: 5 ft.
- Temperature: 68°F / 20°C [yearly average]
- Humidity: 70% [yearly average]
- Wind: 11 mph sustained from noise source
- Ground factor: 0.7 G
- Sound Mitigation Berm in place
- Lowest Recorded Ambient Sound Level at each receptor [see Table 3 (following page)].

Table 3: Final Calculated Projected Sound Pressure Levels.

Receptor	Distance from Center of Pad to Receptor (ft.)	Recorded Ambient Sound Level (dB(A) Leq)	Calculated Impulse Sound Pressure Level (dB(A))	Modeled Ambient Noise (dB(A) Leq)	Change in Ambient Noise (dB(A))
M-1	5,955	56.7	67	56.7	0
M-2	9,925	40.8	71	41.2	0.4
M-3	7,726	59.6	73	59.6	0
M-4	4,908	39.1	79	41.9	2.8
M-5	554	34.7	100	59.7	25
State Land Corner	350	N/A	102	N/A	N/A

1. Staff Request: The provided materials include a revised sound study prepared by H2H Geoscience Engineering PLLC (referred to herein as the Revised Noise Analysis). The noise modeling included in the Revised Noise Analysis utilizes receptor distance measurements from the proposed gravel pad but does not clarify which portion of the 100-foot by 100-foot pad the measurements are made from (e.g. at the nearest edge or corner of the gravel pad, the center, or the furthest edge). Varying the location of the howitzer assembly on the gravel pad and the corresponding receptor distance could result in a discrepancy of 141 feet (hypotenuse of pad), which could skew or reduce the estimated sound pressure level in inverse proportion to the square of the distance or 6 dB at 100 feet. As stated in UCI's February 28, 2023, response to the Agency's Third NIPA, "…the specific placement of instrumentation and test articles will vary within a general range based on test requirements. All instrumentation and test articles are portable and will be emplaced before and after each test. As no permanent structures will be deployed, exact position of placement may vary each time."

Response: The sound source will be fired from the same location in the center of the 100-foot by 100-foot firing pad. The center of the firing pad was used in all prior sound propagation modeling although not explicitly identified in the materials. Moving the sound source to the edge of the pad will be a maximum of 70 feet toward a monitoring location; half the distance if we start in the center, not 141 feet. A 70-foot reduction in distance from the sound source to each monitoring location is used for "Edge of Firing Pad" distances in Table 5 below. As demonstrated below, moving the sound source to the edge of the pad will have negligible effects on the calculated sound pressure level at each monitoring location. (However, again, the sound source will be at the center of the firing pad.)

For this demonstration, the sound pressure levels are calculated using the hemispherical straight-line attenuation method to simplify the comparisons and does not include the sound mitigation berm to show “worst case scenario results”.

$$L_p = L_W - |10 \cdot \log\left(\frac{Q}{4\pi \cdot r^2}\right)|$$

Lp = Sound Pressure Level
Lw = Sound Power level = 163.2 dB(A) (barrel of the M109, 155mm howitzer)
Q = Directivity Factor = 2 (hemispherical sound propagation)
r = Distance to source (meters)

Table 4:
Calculated Sound Pressure Level at Monitoring Locations from Sound Source at Center of Firing Pad

Monitoring Location	Distance From Center of Firing Pad to Monitoring Location (ft.)	Calculated Sound Pressure Level (dB(A))
M-1	5,955	90.0
M-2	9,925	85.6
M-3	7,726	87.8
M-4	4,908	91.7
M-5	554	110.7
State Land Corner	350	114.7

Table 5:
Calculated Sound Pressure Level at Monitoring Locations from Sound Source at Edge of Firing Pad

Monitoring Location	Distance From Edge of Firing Pad to Monitoring Location (ft.)	Calculated Sound Pressure Level dB(A)
M-1	5,885	90.1
M-2	9,855	85.7
M-3	7,656	87.9
M-4	4,838	91.8
M-5	484	111.8
State Land Corner	280	116.6

In sum, moving the sound source to the edge of the firing pad has a maximum increase of 1.9 dB(A) at the corner of State land classified as Wild Forest, 1.2 dB(A) at M-5, and less than 0.1 dB(A) at the remaining monitoring locations. (However, again, the sound source will be at the center of the firing pad.)

Staff Request: Please provide cross-section sheet(s) depicting the proposed typical M109 155 mm howitzer and assembly set up to be utilized on site, including all proposed instrumentation and test articles, that is drawn to scale and depicts howitzer barrel and assembly dimensions and muzzle location. Please label the location of the noise source and its associated sound pressure level source height as measured from the finished grade of the pad.

Response: The muzzle of the 155 mm howitzer barrel assembly is located 6.6 feet above the ground surface and will be that height for all tests (see September 2023 Sound Study, Page 8, Appendix D). Cross-sections of the 155 mm howitzer barrel assembly, and muzzle location (Sound Source) are shown on Figure 2. The location of "Instrumentation and test articles" will vary and depends solely on details of the experimental set up. All instrumentation will be human-portable, with no single component exceeding 1 cubic meter in volume. Any other instrumentation will be directly attached to the barrel assembly. Instrumentation is not of the size to affect calculated sound levels.

Details of the system, as requested cannot be provided. The information requested is considered Controlled Unclassified Information (CUI) Staff advised that information in support of the application is subject to public review. Therefore, specifics as to the system to be used are not being provided.

Staff Request: To allow for review of worst-case scenario noise impacts, please provide scaled cross-section plan sheet(s) depicting the distance between the closest point of the proposed gravel pad or the noise source, whichever is closer, to each of M1- M5, and between the closest point of the proposed gravel pad and the receptor located at the southwest corner of the nearest state land parcel. Please depict the proposed berm on each of these plan sheets.

Response: As stated above, the sound source will only be fired from the center of the firing pad. Nonetheless, moving the sound source to the edge of the firing pad "to provide a worst-case scenario" does not have a significant effect on results (see response above).

Cross sections from the Sound Source (located at the center of the Firing Pad) to the monitoring locations M-1, M-5 and the Wild Forest property corner (R-46) are included as Figure 1. The Sound Mitigation Berm is shown to scale on Figure 1 & 2.

2. Staff Request: Please clarify what materials the berm will be constructed with, and any associated stabilization measures and other erosion and sediment controls.

Response: The berm will be constructed of dirt from the property and will be vegetated

upon completion. Coverage under the State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity is not required because total disturbance will be under one (1) acre. The DEC has confirmed this.

3. Staff Request: Please provide an evaluation of other potential noise mitigation measures, including enclosures and/or silencers (schalldampfer). Please explain why none of these other noise mitigation measures are included as part of the proposal.

Response: Staff have deemed this comment satisfied as of May 8, 2024. No further response required.

4. Staff Request: Please explain why there are separate tables, calculations and conclusions made in the UCI written response received on December 7, 2023, that are not included in the Revised Noise Analysis. For example, as indicated in the Appendix D, Model Data, the noise analysis model input of atmospheric absorption utilizes 20ºC (68ºF), and 70% humidity, and does not include an evaluation of varying weather conditions. However, UCI's written response does include information on varying weather conditions and provides separate tables, including Table 1 that references the modeled sound levels and states that "testing is not anticipated to take place under these conditions" referencing temperature 41ºF/humidity 0%. Another example of this discrepancy is that the UCI response states "(T)he modeled sound pressure level is 130 dB/107 dB(A) at M-5, and 132 dB and 111 dB(A)at State Land classified as Wild Forest property corner;" however this is not discussed or presented in the Revised Noise Analysis. In addition, the UCI response section references the July 2023 Sound Study and not the Revised Noise Analysis.

Response: UCI included Table 1 in the December 7, 2023, written response to explain how environmental factors have no impact on the study's conclusion. (Reference to a July 2023 Sound Study was a drafting oversight.) Table 2 Modeled M109 Sound Levels (with Sound Mitigation Berm) Varying Atmospheric Conditions has been added on page 9 of the November Sound Study, § 4.3.2. The modeled sound pressure levels (with Sound Mitigation berm) at the Wild Forest Property corner can be found on page 15 of the Sound Study, § 5.0.

In addition, weather conditions will not impact noise attenuation. This is supported by the DEC publication Staff referenced previously. Please see Section V.A. "Environmental Setting and Effects on Noise Levels," on pages 8 through 11, specifically paragraph 3, concerning temperature and humidity.

Furthermore, paragraph 4, "Time of Year," and paragraph 5, "Wind," also identify that

sound pressure levels are not affected by season or direction of wind. A noise source in summer has "the greatest potential for causing annoyance because of open windows, outside activities, etc." This is a subjective factor based on a behavioral response to a noise source which is not scientifically measurable. Nonetheless, the nearest inhabited residence is 1 mile away and is the landowner's residence, and the nearest State land classified as Wild Forest has little to no public use.. Concerning the environmental factor of wind, DEC's noise policy states:

> **[while] it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experience at the same distance without wind. This dispels the common belief that sounds levels are increased downwind due to wind carrying noise.**

Per NYSDEC's Program Policy of Assessing and Mitigating Noise Impacts, and UCI's prior modeling of sound pressure levels at various temperatures and humidities, the September 2023 Sound Study utilizing the average temperature and humidity of the project site and a 11-mph wind blowing from the noise source towards receptors is sufficient and does not need to be revised. In sum, UCI's proposal complies with DEC policies and procedures.

5. Staff Request: If testing will not be performed in late fall, winter, or spring conditions when the temperature of 41ºF/humidity 0% scenario is a seasonal possibility, please explain why the Revised Noise Analysis included noise monitoring conducted on December 21 and 22, 2022, but model inputs included summer conditions of 20ºC (68ºF), and 70% humidity. Please clarify the proposed months of operation and any other proposed atmospheric operating restrictions.

   Staff Request: Additionally, application materials previously stated that there would be a maximum of two shots fired per day fired for a maximum of three consecutive days, with an average of 30 shots per year, and that shots would occur for a period of five years. The UCI Response received December 15, 2023, states that testing was not anticipated to take place at conditions of 41 degrees Fahrenheit and 0% humidity, and that conditions in the first column of Table 1 are typical for the project site during summer months. Please provide the proposed maximum number of firings per week, month, and year of the testing period.

Response: Staff have deemed this comment satisfied as of May 8, 2024. No further response is required.

6. Staff Request: Please revise Image 1 to depict the location of the 100-foot by 100-foot pad, all state land boundaries, the southwest corner of the nearest

state land parcel located approximately 300 feet from the northeast corner of the firing pad, the nearest dwellings (including the Pulsifer residence), receptor locations M1 – M4, and the closest point of the proposed gravel pad or the noise source, whichever is closer, to each receptor.

Response: Staff have deemed this comment satisfied. No further response is required.

7. Staff Request: A Norwegian study titled "Noise emission data for M109, 155 mm field howitzer", prepared by the Norwegian Defense Research Establishment (FFI), and dated 5 December 2007 (the Norwegian study), is the only source of information included in the application providing noise level data from howitzers. This study includes a noise level of 130.5 dB measured at 803 feet from a howitzer. The Revised Noise Analysis appears to use this 130.5 dB measurement from the Norwegian study to calculate a modeled source noise level for an M109 155 mm howitzer of 180.8 dB. The Revised Noise Analysis then uses 180.8 dB to model noise levels at the M5 receptor on State land as 127 dB, and noise levels at the nearest residence as 100 dB. The Noise Analysis then determines that the 3.5-dB difference between the noise level data in the Norwegian Study and the modeled noise levels at the project site show "correlation within ISO standards." Please provide an explanation of these ISO standards and the asserted correlation, including a clarification of whether the ISO standards are appropriately used in this context. Please also provide any other available documentation confirming that 3.5 dB is appropriately cited as the maximum limit of error for this proposal.

RESPONSE: The International Standards Organization (ISO) is the premier standards setting and scientific body in the world. It is an independent, non-governmental, international standard development organization composed of representatives from the national standards organizations of member countries. ISO represents the primary source for scientific and technical standards in all fields of science, engineering, technology, research, development, test and evaluation.

ISO was founded on 23 February 1947, and (as of July 2024) it has published over 25,000 international standards covering almost all aspects of technology and manufacturing. It has over 800 technical committees (and subcommittees responsible for standards development.

ISO standards are the *de facto* source for protocols and undisputed array of methods, where applicable, for test and evaluation.

In accordance with ISO standards, the modeled sound pressure level at M-5 is 130 dB / 107 dB(A) and 132 dB / 111 dB(A) at the property corner of State Land classified as Wild Forest. With the additional mitigative effects of the Sound Mitigation Berm (Figure 4) the

sound pressure level at M-5 is 124 dB / 100 dB(A) and 127 dB / 102 dB(A) at the property corner of the State Land classified as Wild Forest. The closest residential structure to the Firing Pad (R-1) is 5,200 ft. northeast with a model impulse sound level of 101dB / 69 dB(A) implementing the Sound Mitigation Berm (Figure 4). During the December 2022 ambient monitoring study truck passes on Hale Hill Road (adjacent to R-1) were frequently measured above 75 dB(A).

The accuracy of a sound propagation model is dependent on the accuracy of the parameters input to the model. The inputs to the sound propagation model are:

- Sound Source Power Level
- Temperature / Humidity
- Topography (responsible for barrier attenuation)
- Ground Factor

The following is a description of how each parameter was determined.

Sound Source Power Level-

The sound power level used in the model is from the Norwegian study titled “Noise emission data for M109, 155 mm field howitzer”. The study was conducted to evaluate the sound emission of a M109, 155mm Field Howitzer (same Sound Source proposed to be used by UCI). The data collected in the study was vetted, approved and used by the Norwegian Defense Estates Agency to determine the sound level produced by a howitzer near military firing ranges and training fields.

Temperature / Humidity-

The attenuation of sound propagating outdoors between a fixed source and receiver fluctuates due to variations in temperature and humidity along the propagation path. To demonstrate how fluctuations in temperature and humidity affect modeled sound levels the following scenarios shown in Table 6, below, were modeled. The first column (Temperature 68ºF / Humidity 70%) represents the conditions used in the sound study and are typical for the project site during summer months. The maximum difference from modeled conditions is 3 dB(A) at M-4 and M-2 (Temperature 41ºF / Humidity 0%) testing is not planned to take place under these conditions.

Table 6: Modeled M109 Sound Levels (with Sound Mitigation Berm) by Temperature and Humidity

Monitoring Location	Molded dB(A) Sound Level				
	Temperature 68°F / Humidity 70% (used in sound study)	Temperature 41°F / Humidity 95%	Temperature 41°F / Humidity 0%	Temperature 95°F / Humidity 0%	Temperature 95°F / Humidity 95%
M-1	67	68	67	66	67
M-2	71	72	74	72	71
M-3	73	74	75	73	73
M-4	80	81	83	82	79
M-5	100	100	101	101	100

Topography –

The topography within the model is based on bare earth DEM from New York State LiDAR data. The accuracy of barrier attenuation in the model is directly related to the topography used. The LiDAR data used has a vertical accuracy of seven inches, providing representative bare earth barrier attenuation in the model.

Ground Factor –

Ground attenuation is how sound is reflected or absorbed by the ground based on sound frequency and ground porosity. Ground attenuation is categorized by three reflecting surfaces:

a) Hard ground - includes paving, water, ice, concrete, and all other ground surfaces having a low porosity. Hard ground will reflect sound. Hard ground is represented by a ground factor of G=0.

b) Porous ground – includes grass, trees or other vegetation, and all other ground surfaces suitable for the growth of vegetation. Porous (soft ground) will absorb sound. Porous ground is represented by a ground factor of G=1.

c) Mixed ground – consists of both hard and porous ground. Mixed ground will absorb or reflect sound based on sound frequency and a ground factor of G ranging from 0 to 1.

The study area is composed of porous ground; a ground factor of G=0.7 is used in each sound propagation model to be conservative.

ISO Acoustics - Attenuation of sound propagation outdoors states under Clause 9, Accuracy and Limitations of the Method (ISO 9613-2:2024), states, “The attenuation of sound propagating outdoors between a fixed source and receiver fluctuates due to

variations in the meteorological conditions along the propagation path. Restricting attention to moderate downwind conditions of propagation, as specified in Clause 5 (Meteorological Conditions), limits the effect of variable meteorological conditions on attenuation to reasonable values." Reasonable values are stated to ±3 dB though can be larger dependent on octave band sound pressure levels.

The accuracy of modeled sound pressure levels is directly related to the accuracy of input parameters. As discussed above, the source sound power level, topography, and ground factor are reflective of real-world conditions onsite and do not introduce inaccuracies within the model that would produce sound pressure levels higher than currently modeled sound pressure levels. Inaccuracies in modeled sound pressure levels at each monitoring location related to meteorological conditions (temperature/humidity) are demonstrated to be ±3 dB (Table 6). When comparing modeled sound pressure levels at the project site to the recorded sound level data in the Norwegian Study the modeled sound pressure levels and recorded sound pressure levels are within 3.5 dB.

> Staff Request: Please confirm through field-verification at an authorized location and through independent third party verifications that 180.8 dB is the noise level produced by M109 155 mm howitzers.

Response: The are two reliable publications which support an estimated 180.8 dB / 163.2 dB(A) noise level, and explained the methodological approach used to reach this calculation. These publications have previously been submitted. The first publication is the Norwegian Study, which professional engineer and weapons design expert, Dr. Bob Dillon, in prior meetings with Staff (his CV is attached as Appendix E to UCI's response to the APA's March 1, 2022, letter), has attested to the publication's authenticity and reasonableness. The second is a publication from the US Army Center for Health Promotion and Preventative Medicine Hearing Conservation Program titled "Noise Levels of Common Army Equipment" (see page 4 of UCI's reply to the First NIPA). This publication identifies the peak pressure level to be 166.1 dB(P) in the fighting compartment, with hatches open, for a self-propelled M109 155mm howitzer and a peak pressure level of 178 dB(P) at the gunner position for a towed 155mm howitzer. As the noise source is only the barrel assembly of the 155mm howitzer, UCI's calculated higher noise level of 180.8 dB / 163.2 dB(A) is reasonable based on the other data supplied.

> Staff Comment: Please note that NYSDEC's Program Policy "Assessing and Mitigating Noise Impacts" dated October 6, 2000 last revised February 2, 2001 states that "In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive." The approximate noise level of 127 dB does not appear to be in character with the recorded ambient noise level of approximately 37.2 dBA,

which per NYSDEC's noise policy, is most similar to wilderness noise levels at approximately 35 dBA.

Response: UCI has noted that impulse noise levels from lawful firearms used for hunting ranges from 160 dB (12-gauge shotgun with an 18.5-inch barrel) to 164 dB (.357 Magnum). Chainsaws produce continuous noise levels between 105 dB and 120 dB. Naturally occurring thunder produces an approximate noise level of 120 dB. These figures are not A-weighted.

The modeled noise level at the closest corner of State land classified as Wild Forest to the center of the firing pad is 127 dB (102 dB(A)) with the sound mitigation berm. This is 37 dB(A) greater than a noise level of 35 dB(A) but is 37 dB less than common hunting firearms.

For further context, a single shot from the 155mm Howitzer creates 50 milliseconds of impulse sound exposure. There will be 30 shots per year for five years (150 total). This means that over the life of the project (five years), there will be ***7,500 milliseconds*** of impulse sound exposure.

Notwithstanding the above, there are three permitted hard rock mining operations within a 2.1-mile radius of the project site that are also immediately adjacent to State lands classified as Wild Forest. They are all high pressure level noise sources in the vicinity. The continuous noise levels produced by the mining operations far exceed those of UCI's proposed project, and the impulse noise produced by mines is generally the same or greater than a single shot from a 155mm Howitzer.

8. Staff Request: The "Noise emission data for M109, 155 mm field howitzer" study referenced in the Revised Noise Analysis references a maximum charge of 5 modules DM72 with each module containing 2.44 kilograms propelling charge, while USACHPPM materials referenced in the UCI response received by the Agency July 18, 2022 reference the sound level for a M4A2 zone 7 charge. Please confirm that this will be the maximum charge used. Please also explain how the two charges compare and the effect will have on the level of sound produced.

Response: All calculated sound pressure levels submitted by UCI are based on 5 modules DM72 charges with 2.44 kg of propellent. M4A2 zone 7 charges have nominally the same energy and would produce the same calculated sound pressure levels. Any further specific details of the performance of the 155mm Howitzer are sensitive and protected information not available to the APA.

9. Staff Request: Please provide an updated noise analysis that accounts for the confirmed height of the noise source from the gravel pad and the location of

the noise source at the closest point of the gravel pad to each receptor. This updated noise analysis must include all tabular, calculated, and conclusory information included in the latest UCI response, Modal Data in Appendix D, and barrier attenuation calculations that account for the most conservative/worst case scenario height and location of the noise source in relation to each receptor. The updated noise analysis must also account for all proposed months of operation and any proposed atmospheric operating restrictions. In addition, the analysis must include revised tabular information, Modal Data in Appendix D, and barrier attenuation calculations that account for the height and location of the noise source in relation to each receptor, and must include sound pressure levels expressed as both dB and dBA. This updated analysis must include a cover sheet with the seal of a NYS licensed professional engineer.

Response: Staff is requesting an updated noise analysis to include modeling of the noise source from 6 separate locations on the firing pad, in addition to the proposed firing location at the center of the firing pad. However, to achieve viable and repeatable data, the source must stay in the same place between tests and that will be the center of the pad, as mentioned above. These 7 separate modeled scenarios must also include calculations for at least 3 separate noise source heights: the confirmed height of the sound source (6.6 ft.), an unspecified "most conservative" height, and unspecified "worst case scenario" height. Accordingly, 21 modeled scenarios would be needed. To account for weather conditions for all proposed months of operation – which here is year-round – for the 21 modeled scenarios would require an additional 12 analyses, resulting in a total of 252 modeled scenarios. To conduct modeling for the "proposed atmospheric operating restrictions" will require a minimum of 3 different scenarios for each potential month of operation: average monthly condition, plus the warmest and coldest conditions. The total number of modeled scenarios would amount to 756.

Moving the sound source to the edge of the pad will have negligible effects on the calculated sound pressure level at each monitoring location and will never occur during the tests (see response to Comment 1). UCI will not be changing the height of the sound source from 6.6 ft. and UCI's sound propagation model includes atmospheric conditions.

The Sound Source will only be tested from the center of the Firing Pad at a height of 6.6 ft. above grade (Figure 1 & 2). Additional information on attenuating factors included within the model (distance attenuation, atmospheric absorption, ground attenuation, and barrier attenuation) have been added to the November Sound Study, § 4.3. To demonstrate the effect of each attenuating factor used in the model straight line projection sound pressure levels (distance attenuation only), are compared to sound propagation modeled results (November Sound Study, § 4.4. Table 3). The tabular information shows the distance from the Sound Source to each receptor, and attenuation from the Sound Source to each receptor. Modeled Z-weighted sound pressure levels from the Sound Source to receptors (with and without the Sound Mitigation Berm) are shown in Table 4a

of the November Sound Study, § 4.5.1

Norfolk Beier PLLC



By: _____
Matthew D. Norfolk, Esq.
Authorized Representative
On behalf of Michael Hopmeier, Sponsor,
and Unconventional Concepts, Inc., Applicant

APA EPS Letter 5
07/07/2025

935

July 7, 2025

Matthew D. Norfolk, Esq.
1936 Saranac Ave, Suite 106
Lake Placid, NY 12946

Re: APA Project 2021-0276
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received on June 20, 2025. The submission provided important information in response to the Agency's January 2, 2024 Notice of Incomplete Permit Application (NIPA). As a result, Items 2, 3, 4, 5, and 8 of the January 2, 2024 NIPA are either satisfied or no longer required.

The response received on June 20, 2025 to Item 1 of the January 2, 2024 NIPA states that "Cross-sections of the 155 mm howitzer barrel assembly, and muzzle location (Sound Source) are shown on Figure 2." However, "Figure 2" is not included with your response, and a previously submitted document is not specified. Additionally, the response to Item 1 states "Cross sections from the Sound Source (located at the center of the Firing Pad) to the monitoring locations M-1, M-5 and the Wild Forest property corner (R-46) are included as Figure 1. The Sound Mitigation Berm is shown to scale on Figure 1 & 2." Figure 1 is also not included with the response and a previously-submitted document is not specified. The response to Item 7 references the "Sound Mitigation Berm (Figure 4)," which is also not provided, and a previously submitted document is not specified. Please provide all referenced tables, figures, etc. in a final noise impact analysis as described below.

The June 20, 2025 response states that staff have deemed Item 6 of the January 2, 2024 NIPA satisfied. Item 6 has not been satisfied and is still required.

The response to Item 9 of the January 2, 2024 NIPA indicates that a potential of 756 different modeled scenarios would be necessary to address the request. Only the worst-case scenario for the five receptors is required. This response should include all tabular, calculated, and conclusory information utilizing sound pressure levels expressed as both dB and dBA, and the analysis must be stamped by a NYS licensed professional engineer as previously requested. Based on the June 20, 2025 response, it is understood that the height and location of the source are fixed and will not change.

The information detailed above is required to review the application. You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on the proposed project will begin.

If you have any questions regarding this letter or the project review process, please contact me at the (518)-891-4050.

Sincerely,

/s/ Fritz Aldinger

Fritz Aldinger
Environmental Program Specialist 1 (EPS1)

Attachment: January 2, 2024 NIPA

cc: Michael Hopmeier

937

November 2024
Sound Study
Received July 2025

938

SOUND STUDY

UNCONVENTIONAL CONCEPTS, INC.

APA PROJECT #2021-0276

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency

RECEIVED

Date: July 10, 2025

Prepared for:
Unconventional Concepts, Inc.
620 Herndon Parkway, Suite 120A
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Prepared by:

Bowman Consulting, Engineering, Land Surveying and Landscape Architecture

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I, Trevor Thomas, a licensed Professional Engineer in the State of New York, hereby certify that the work represented in the document is accurate, in conformance with applicable codes at the time of submission and has been prepared in conformance with normal and customary standards of practice and with a view to the safeguarding of life, health, property and public welfare.

Date:

November 2024

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1.0 INTRODUCTION

Unconventional Concepts, Inc. (UCI) has proposed to the Adirondack Park Agency (APA), an application for the operation of a projectile testing range in Lewis, New York. The range (Site) is at 195 Hale Hill Lane (Figure 1). Bowman Consulting, Engineering, Land Surveying and Landscape Architecture (Bowman) prepared this report to identify and evaluate the potential impacts of off-site sound propagation from the proposed application. The potential sound impacts associated with the application were assessed in accordance with the requirements set forth by the Adirondack Park Agency (APA) and the New York State Department of Environmental Conservation (NYSDEC).

2.0 PROJECT BACKGROUND

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. The range will be developed to assess the internal ballistics of various kinetic systems used by the United States. The focus is to determine the effectiveness of various manufacturing approaches and techniques used in the manufacture of cannon barrels. The goal of the overall project is to decrease the weight of these systems to ensure the most efficient means of manufacturing and recuring cost of ownership, thereby reducing waste and cost, as well as improving performance.

This effort will focus on the test and evaluation of these new systems in support of a critical US Army research program managed by Benét Laboratories at Watervliet Arsenal in Albany, NY. The project will focus on the instrumentation and firing of these systems in a constrained area to allow for measurement and assessment of the internal ballistics and kinetic and kinematic effects of these modern designs.

All test equipment and instrumentation will be portable; equipment will be deployed as needed to the Site for a test and will then be completely removed at the end of the test.

The testing schedule is as follows:

- A shot will only be fired on weekdays between the hours of 10:00 AM and 4:00 PM.
- A maximum of two shots will be fired in one day.
- Shots will be fired a maximum of three consecutive days.
- Testing is anticipated to continue for a period of five years, with an average of 30 shots per year.

The Site is on land owned by Pulsifer Logging, LLC (38.1-1-31.000). UCI is using the land with the landowner's (written) permission. The Sound Source (155 mm howitzer barrel assembly) will be located in the center of a 100 ft. X 100 ft. crushed gravel pad (Firing Pad). A haul truck will be used to transport the barrel assembly to the firing pad. The Operations Control Area is adjacent to the Firing Pad; the Target Area is 625 ft. east of the Firing Pad (Figure 2). The 155 mm howitzer barrel assembly and the Haul Truck are the only sources of sound that could produce a potential signific environmental impact associated with the project.

The Site is accessed via an access road off Hale Hill Road. The area surrounding the Site is heavily forested with a topographic high to the east and south. NYS Route 9 is located approximately 7,000 ft. to the east. Within a two-mile radius of the site (Project Area) forty-four Residential Receptors (RR) were identified. The closest RR is the Pulsifer residents (R-1) 5,200 ft. to the northeast off Hale Hill Road. Five parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius (Figure 1).

Bowman developed a Scope of Work (SOW) approved by the APA specifying the locations sound level monitoring was conducted. The SOW incorporating the APA's November 28, 2022 comments on the location of Monitoring location M-3 and M-4 is attached as Appendix E.

3.0 SOUND LEVEL MONITORING

Sound level monitoring was conducted by Bowman on December 20, 2022, and December 21, 2022. Monitoring was conducted at the five locations identified in the SOW (Figure 1).

3.1 ENVIRONMENTAL CONDITIONS

Weather data was collected from a weather station located at The Silo (Figure 1).

3.1.1 December 20, 2022

During the study period, the weather conditions included temperatures between 27 °F and 31 °F, winds out of the south between zero and six miles per hour, 70% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.1.2 December 21, 2022

During the study period, the weather conditions included temperatures between 23 °F and 32 °F, winds out of the southwest between zero and four miles per hour, 75% to 83% humidity, and clear to partly cloudy skies. Roads were dry; six-fourteen inches of fresh snow was on the ground from the previous storm.

3.2 MONITORING EQUIPMENT

Sound level measurements were recorded using calibrated Casella CEL-633 ANSI or Quest SoundPro DL-2-1/3 sound level meters. Each monitor was set to log A-weighted, fast response, at one-second intervals. Each Casella monitor was programed to record audio to aid in identifying sound sources. Each unit was field calibrated before each monitoring event; each unit was also laboratory-qualified, technician calibrated (Appendix B). Each meter was tripod mounted at an approximate height of 5 feet, microphones were covered with windscreens. Monitors were outfitted with external batteries.

3.3 MONITORING LOCATION SOUND LEVELS

Sound levels were collected as discussed in Section 3.2 at each monitoring location between 10:00 a.m. – 4:00 p.m. (proposed testing hours). Sound level data was cleaned to remove anomalous sound sources, and data outside monitoring periods. Staffed sound level monitoring was conducted at each monitoring location to log the relative loudness, and the types of sounds that could be heard at each monitoring location. Photos of each monitoring location are provided in appendix B.

3.3.1 Monitoring Location M-1 –

Monitoring location M-1 is adjacent to Residential Receptor R-1 on Hale Hill Road at elevation 705 ft. amsl. 5,955 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-1 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-1 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic on Hale Hill Rd. to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 81.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 56.7 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Heavy truck traffic to Pulsifer Mill,
- Site operations at Pulsifer Mill,

Secondary –
- Aircraft flyover, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 27.5 to 83.0 dBA.
- The average equivalent continuous sound level (L_{eq}) was 57.2 dBA

3.3.2 Monitoring Location M-2 -

Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,925 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surrounding Pulsifer Rd.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –

- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 24.8 to 70.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 42.5 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9 and Pulsifer Road,
- Heavy truck traffic on access road to NYCO Oak Hill Mine,

Secondary –
- Distant mine noise,
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 25.0 to 70.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.8 dBA

3.3.3 Monitoring Location M-3

Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,726 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9,

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq, 1\text{-}sec}$) ranged from 26.2 to 82.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 59.6 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Traffic on NYS Route 9,

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 26.1 to 86.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 61.2 dBA

3.3.4 Monitoring Location M-4

Monitoring Location M-4 is southwest of the Firing Pad next to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 4,908 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 18.1 to 70.7 dBA.
- The average equivalent continuous sound level (L_{eq}) was 39.1 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –
- Occasional birds,
- Recreational use (snowmobiles),

Secondary –
- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.5 to 71.4 dBA.
- The average equivalent continuous sound level (L_{eq}) was 40.9 dBA.

3.3.5 Monitoring Location M-5

Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 554 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Ambient sound levels – with normal activities taking place the results of sound monitoring at M-2 were as follow:

December 20, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Occasional birds,
- Recreational use (snowmobiles),

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.6 to 65.2 dBA.
- The average equivalent continuous sound level (L_{eq}) was 37.2 dBA.

December 21, 2022
The source of sound from 10:00 a.m. to 4:00 p.m., listed in order of highest to lowest;

Primary Source –

- Occasional birds,
- Recreational use (snowmobiles),

Secondary –

- Aircraft flyovers, and
- Wind through foliage.

- One-second sound levels ($L_{eq,\ 1\text{-}sec}$) ranged from 19.8 to 58.1 dBA.
- The average equivalent continuous sound level (L_{eq}) was 34.7 dBA.

4.0 SOUND PROROGATION MODEL

4.1 SOUND SOURCE (M109A3GN 155MM FIELD HOWITZER)

A sound propagation model was developed for the area within a two-mile radius of the Firing Pad using the International Standards Organization ISO 9613 -1,2,3 standards applied in the dBmap.net noise mapping tool. The model accounts for surface reflection and absorption, atmospheric absorption, geometric divergence, weather conditions, topography, and source sound power level.

The sound power level of the Source was calculated based on the sound pressure levels shown in Table E.2 of Appendix E (Noise Emission Data for M109, 155mm Field Howitzer). The goal of the analyses was to develop data that could be used to model the attenuation of sound produced by a howitzer due to the previous lack of available information. The results of the Norwegian Defense Research Establishments (FFI) study demonstrated correlation with their recorded sound levels from the field (data used in Bowmans's analyses) and proved to be suitable for use in the FFI database.

The sound pressure levels shown in Table E.2 were measured at 803 ft. (245 meters) from the sound source by seven sensors positions at increasing angles from the direction of fire. Sensor 1 is positioned 32 degrees from the direction of fire and recorded a sound pressure level of 130.5 dB (loudest recorded sound level across the seven sensors) at 803 ft. (245 meters). The data shown in table E.2 was produced taking the energy mean of 15 shots. Using industry standard calculations, the sound power level at the Sound Source (barrel of the M109, 155mm howitzer) was calculated to be 180.8 dB (163.2 dB(A)). The Sound Source sound level is without ground corrections. Uncorrected data has a higher sound presser level than corrected data providing a conservative sound level model (see Appendix E, Table E.1, free field, compared to Table E.2, without ground correction).

Table 1 Shows the recorded sound pressure level from Table E.2 for each frequency indicated. The sound power level was calculated using the following formula.

$$L_W = L_p + \left|10 \cdot \log\left(\frac{Q}{4\pi \cdot r^2}\right)\right|$$

Lp= Sound Pressure Level = recorded sound pressure level from Table E.2
Lw= Sound Power level
Q= Directivity factor = 1 (Spherical Sound Propagation)
r= distance to source = 245 meters

The calculated A-weighted sound power level was calculated by adding/subtracting the dB(A) Filter to the calculated sound pressure level.

The resulting total sound level 180.8 dB / 163.2 dB(A) is calculated using the formula below and the calculated sound power levels show in Table 1.

$$L_\Sigma = 10 \cdot \log_{10}\left(10^{\frac{L_1}{10}} + 10^{\frac{L_2}{10}} + \cdots + 10^{\frac{L_n}{10}}\right) \text{ dB}$$

Lε = Sum level of sound 180.8 dB(A) / 163.2 dB(A)
L_n = Sound pressure from separate sources

Table 1: Recorded Sound Pressure level / Calculated Sound Source Power level

Frequency (Hz)	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**16000**
Recorded M109 Sound Pressure Level (dB) 245 m	120.4	116.5	105.7	90.3	101.2	99.9	96.4	93.1	88.8	86.1
Calculated Sound Power Level (dB)	179.1	175.3	164.5	149.1	160.0	158.7	155.2	151.9	147.6	144.9
Calculated Sound Power Level (dB(A))	139.6	149.1	148.4	140.5	156.8	158.7	156.4	152.9	146.5	138.3
dB(A) Filter	-39.5	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	-6.6

All input and results of the sound propagation model are attached as Appendix F.

The Image below (Image 1) demonstrates the accuracy of the sound propagation model. Image 1 shows the modeled sound pressure level (not A-weighted) at M-5 (same location as shown on Figure 3) and a receiver located 803 ft. (245 meters) west of the source labeled “Test Point.” The sound source (barrel of the M109, 155mm howitzer (180.8 dB), and all model parameters are unchanged. The Test Point has a modeled sound level of 127 dB; the recorded sound level from Table E.2 of Appendix E is 130.5 dB showing correlation within ISO standards.

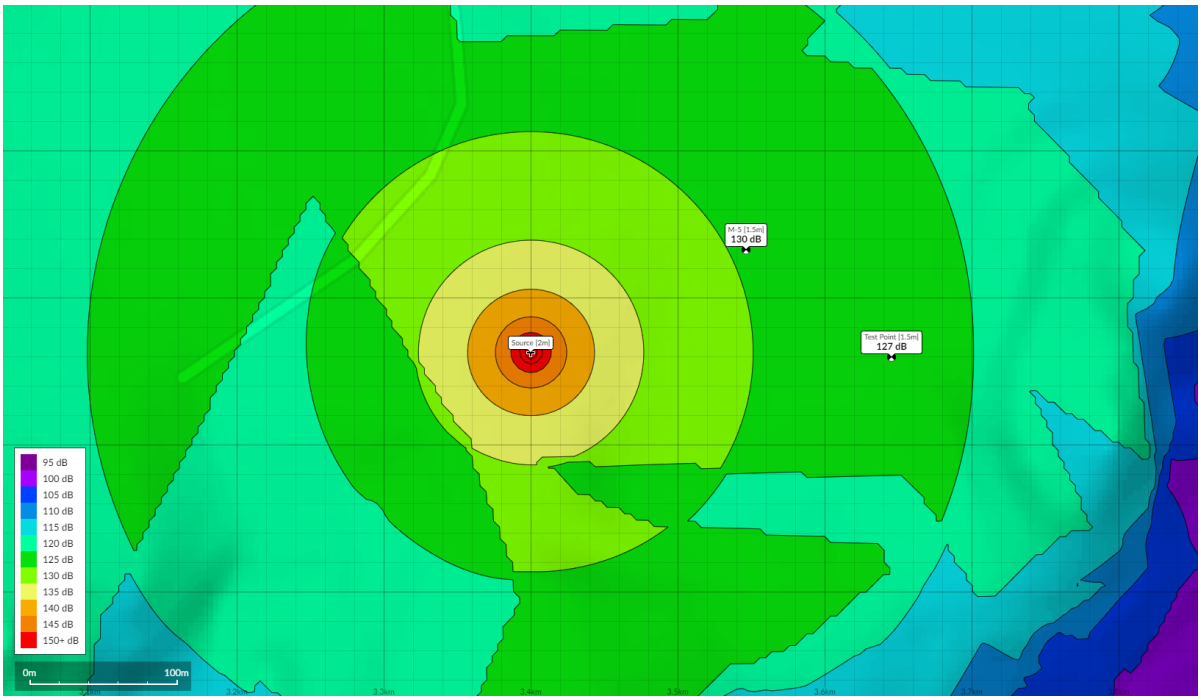


Image 1 – Modeled sound pressure level (not A- weighted) with Test Point

The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and Sound Source height of 6.6 feet is used. This field howitzer model is typical for its type and would represent the noisiest field howitzer tested on Site. The modeled scenario shows the M109A3GN firing from the Firing Pad (only location Sound Source will be operated) as shown on Figure 2. Appendix D summaries model input data.

The sound propagation models show the modeled impulse sound level produced by the Sound Source; the duration of the impulse sound level is approximately 4 milliseconds. Model results are shown without a 13-foot berm (Sound Mitigation Berm) north of the firing pad (Figure 3) and with the Sound Mitigation Berm north of the firing pad (Figure 4). The location of the Sound Mitigation Berm is shown on Figure 1 &2. Sound pressure levels are A-weighted and shown in the form of isolines in 5 dB intervals from 45 dB(A) to 130 dB(A). Modeled sound levels at each monitoring location are labeled.

4.2 40-TON HAUL TRUCK

A sound propagation model was developed for the same two-mile radius of the Firing Pad following the same standards. The model assumes moderate downwind propagation (wind direction within an arc of 90 degrees with the wind blowing from the source at 11 M.P.H.), and ground-based temperature inversion. A ground factor of 0.7 G is used to be conservative. A receiver height of 5 feet, and sound source height of 6.6 feet is used. The sound power level used for the 40-ton Haul Truck (117.6 dB / 115.7 dB(A) is provided in the dBmap database. The Sound Mitigation Berm was not used for the 40-ton haul truck sound propagation model. Appendix D summaries model input data.

The 40-ton Haul Truck being modeled is similar to or louder than the haul truck that will be used to transport the barrel assembly and measurement equipment to the Firing Pad. Figure 5 shows the access road the Haul Truck will be operating on to access the Firing Pad. The Haul Truck was modeled operating at three

locations on the access road that would have the highest modeled sound level at identified receptors due to proximity and topography.

The sound propagation model shows the modeled sound level produced by the 40-ton Haul Truck (Figure 5). Sound levels are A-weighted and shown in the form of isolines in 5 dB intervals from 20 dB(A) to 85 dB(A). Modeled sound levels at each monitoring location are labeled.

4.3 ATTENUATION FACTORS USED IN MODEL

Sound propagation model results are exported in tabular format to demonstrate the effect each attenuating factor has on the total modeled sound levels (Appendix F).

4.3.1 Distance Attenuation (Geometric Divergence)

Geometrical divergence refers to the spherical spreading in the free field from a point sound source (static/mobile equipment). Sound attenuates due to geometric divergence by approximately six dB for each doubling of distance from the source, independent of frequency. Attenuation, in decibels, from geometric divergence is calculated in the model using the following formula:

$$A_{\text{div}} = [20\lg(d/d_0)+11]\text{dB}$$

where

d is the distance from the source to receiver, expressed in meters;
d_o is the reference distance (=1m).

The calculated attenuation due to geometric divergence from each sound source to each receiver is shown under "Receiver Results – Full Detail" heading *Ad* (Appendix F).

4.3.2 Atmospheric Absorption

Atmospheric absorption is how sound attenuates in air based on air temperature, relative humidity, and sound frequency. Attenuation, in decibels, from atmospheric absorption is calculated in the model using the following formula:

$$A_{\text{atm}} = \alpha_{\text{atm}} d / 1000$$

where

d is the distance from the source to the receiver, expressed in meters;
α_{atm} Is the atmospheric attenuation coefficient for each octave band expressed in decibels per kilometer.

Atmospheric absorption is more significant at higher frequencies and long distances, though the effect on the overall sound pressure level is generally insignificant. To demonstrate how varying atmospheric conditions affect modeled sound pressure levels the M109 with Sound Mitigation Berm sound propagation model was run modifying temperatures and relative humidity only (Table 2). The results show that the atmospheric conditions used in the Sound Study (temperature 20ºC / relative humidity 70%) result in sound pressure levels that are a maximum of four dB(A) lower than the worst-case atmospheric conditions (temperature 0ºC / relative humidity 0%) and up to three dB(A) higher than other modeled atmospheric conditions.

It is important to mention that sound modeling typically utilizes a temperature of 68ºF and relative humidity of 70% for atmospheric conditions. It is also important to note that the freezing temperature low humidity scenario is associated with adverse weather conditions when people are not expected to be outdoors or recreating.

Table 2: Modeled M109 Sound Levels (with Sound Mitigation Berm) Varying Atmospheric Conditions

Monitoring Location	Modeled dB(A) Sound Level				
	Temperature 20ºC / Humidity 70%	Temperature 0ºC / Humidity 100%	Temperature 0ºC / Humidity 0%	Temperature 35ºC / Humidity 0%	Temperature 35ºC / Humidity 100%
M-1	67	68	67	66	67
M-2	71	73	74	72	71
M-3	73	74	75	73	73
M-4	79	81	83	82	79
M-5	100	100	101	101	100

The calculated attenuation due to atmospheric absorption from each sound source to each receiver is shown under "Receiver Results – Full Detail" heading *Aa* (Appendix F).

4.3.3 Ground Attenuation (Ground Effect)

Ground attenuation is how sound is reflected or absorbed by the ground based on sound frequency and ground porosity. Ground attenuation is categorized by three reflecting surfaces:

a) Hard ground - includes paving, water, ice, concrete, and all other ground surfaces having a low porosity. Hard ground will reflect sound. Hard ground is represented by a ground factor of G=0.

b) Porous ground – includes grass, trees or other vegetation, and all other ground surfaces suitable for the growth of vegetation. Porous (soft ground) will absorb sound. Porous ground is represented by a ground factor of G=1.

c) Mixed ground – consists of both hard and porous ground. Mixed ground will absorb or reflect sound based on sound frequency and a ground factor of G ranging from 0 to 1.

The study area is composed of mixed ground; a ground factor of G=0.7 is used in each sound propagation model to account for much of the study area being heavily vegetated (soft ground). Depending on sound level frequency, the ground factor will increase or decrease calculated sound levels. The calculated reflection or attenuation due to ground attenuation from each sound source to each receiver is shown under "Receiver Results – Full Detail" heading *Ag* (Appendix F).

4.3.4 Screening (barrier attenuation)

Barrier attenuation is how sound is screened by obstacles (houses, topography, walls, etc.). An object is considered as a screening obstacle when the following requirements are met:

- The surface density is at least 10 kg/m^2;

- The object has a closed surface without large cracks of gaps;
- The horizontal dimension of the object normal to the source-to-receiver line is larger than the acoustic wavelength for the octave band of interest.

The topography (including Sound Mitigation Berm) is the only screening object used in the analysis. The maximum barrier attenuation is 20 dB in the case of a single screen or 25 dB for multiple screens (ground surface). The calculated barrier attenuation from each sound source to each receiver is shown under "Receiver Results – Full Detail" heading *Ab* (Appendix F).

4.4 SOUND PROPAGATION MODEL COMPARISON TO STRAIGHT-LINE PROJECTION METHOD

The 155 mm Howitzer with Sound Mitigation Berm sound propagation model was used to compare straight-line projection method results to sound propagation model results. The sound source is projected to all monitoring locations with the addition of the Wild Forest property corner (Figure 4).

The calculated sound pressure level and attenuation for each sound source across each frequency to each receiver location was exported from the 155 mm Howitzer with Sound Mitigation Berm sound propagation model. Distance attenuation (Column "E") attenuates sound following the invers square law, and generally contributes to the largest attenuation in a sound propagation model if receptors are a great distance from sound sources. Attenuation due to atmospheric absorption (Column "F") varies by frequency and the effect on the overall sound pressure level is generally insignificant. Attenuation from ground effect (Column "G") varies by frequency; low and high frequency sounds are reflected while midrange frequencies are absorbed. Barrier attenuation is dependent on how screened a sound source is from a receiver. Barrier attenuation (column "I") is based on how topography screens each monitoring location (Figure 4).

From the exported data the sound level at each receiver location for the sound source due to attenuation from distance attenuation and weighting only was calculated (column "M") by adding the distance attenuation (column "E") and A-weighting (column "I") to the source sound power level (column "D"). The total modeled sound pressure levels (column "L" and "M") were calculated using the additive effect formula (below) and the data in column "J" and "K" (Table 3).

The straight-line projection method sound levels (column "N") were calculated using the distance from the source to each monitoring location (column "B") and the total sound power levels for the sound source (Table 1 & 3 Attached due to length).

The straight-line projection method for calculating sound attenuation follows the same principle as distance attenuation in a sound propagation model. Attenuation due to distance only in the sound propagation model (column "M") produced the same result as the straight-line projection method under spherical sound propagation (column "N"). The additional attenuation factors (atmospheric absorption column "F", ground effect column "G", and barrier attenuation "H") do not contribute to the same degree as distance attenuation (Table 3 Attached due to length).

4.5 EFFECT ON AMBIENT SOUND LEVELS

4.5.1 Sound Source (M109A3GN 155mm Field Howitzer)

To measure the effect the modeled impulse sound (shot fired from the howitzer) would have on ambient sound levels within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. The $L_{eq, 1\text{-}sec}$ recorded sound levels were exported to allow each $L_{eq, 1\text{-}sec}$ sound level over the monitoring period (10:00 a.m. to 4:00 p.m.) to be viewed individually. To measure how impulse sound levels would affect the ambient sound level at each monitoring location the modeled impulse sound level without the Sound Mitigation Berm (Figure 3) and with the Sound Mitigation Berm (figure 4) at each monitoring location is input into the ambient data for that monitoring location. This was done twice to model the effect of two impulse sound levels (two shots per day). The results of each modeled scenario are compared to the recorded ambient sound levels in Table 4b (12/20/2022 ambient sound levels) and Table 4c (12/21/2022 ambient sound levels).

Table 4a: 155 mm Howitzer (Sound Source) Modeled Impulse Sound Levels

Monitoring Location	155 mm Howitzer (Sound Source) Without Sound Mitigation Berm		155 mm Howitzer (Sound Source) With Sound Mitigation Berm	
	Modeled Impulse Sound Level dB	Modeled Impulse Sound Level dB(A)	Modeled Impulse Sound Level dB	Modeled Impulse Sound Level dB(A)
M-1	105	75	99	67
M-2	101	71	101	71
M-3	103	73	103	73
M-4	107	79	107	79
M-5	130	107	124	100
Wild Forest Property Corner (R-46)	132	111	127	102

Table 4b: Tuesday, December 20, 2022, Howitzer Modeled Sound Level Summary

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer (Sound Source)			155 mm Howitzer (Sound Source) With Sound Mitigation Berm		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	57.2	75	57.2	0	67	57.2	0
M-2	42.5	71	42.8	0.3	71	42.8	0.3
M-3	59.6	73	59.6	0	73	59.6	0
M-4	39.1	79	41.9	2.8	79	41.9	2.8
M-5	37.2	107	66.7	29.5	100	59.7	22.5

Table 4c: Wednesday, December 21, 2022, Howitzer Modeled Sound Level Summary

Monitoring Location	Recorded Ambient dB(A) Leq	155 mm Howitzer			155 mm Howitzer (Sound Source) With Sound Mitigation Berm		
		Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)	Modeled Impulse Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	56.7	75	56.8	0.1	67	56.7	0
M-2	40.8	71	41.2	0.4	71	41.2	0.4
M-3	61.2	73	61.2	0	73	61.2	0
M-4	40.9	79	42.9	2	79	42.9	2
M-5	34.7	107	66.7	32	100	59.7	25

4.5.2 40-ton Haul Truck

To measure the effect the modeled sound (Haul Truck operating on site access road) would have on ambient sound level within the Project Area the following method is used. The recorded sound levels for each monitoring location in Section 3.3 are used as the ambient condition at each monitoring location. Figure 5 and Table 5a / Table 5b show the modeled sound level at each monitoring location. The modeled sound level is well below the recorded ambient sound level at monitoring location M-1, M-2, M-3, and M-4 showing no potential impact. The modeled sound level at M-5 (66.7 dB(A)) is above the recorded ambient sound level of 34.7 dB(A). To measure how sound levels would affect the ambient sound level at M-5 the modeled sound level (Figure 4) at M-5 is input into the ambient data for that monitoring location. This was done ten times to model the effect of ten haul truck passes. No more than ten haul truck passes are

anticipated per day. The modeled scenario at M-5 is compared to the recorded ambient sound levels in Table 5a (12/20/2022 ambient sound levels) and Table 5b (12/21/2022 ambient sound levels).

Table 5a: Tuesday, December 20, 2022, 40-ton Haul Truck Modeled Sound Level Summary

Monitoring Location	Recorded Ambient dB(A) Leq	40-ton Haul Truck		
		Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	57.2	44	-	-
M-2	42.5	20	-	-
M-3	59.6	33	-	-
M-4	39.1	33	-	-
M-5	37.2	60	37.9	0.7

Table 5b: Wednesday, December 21, 2022, 40-ton Haul Truck Modeled Sound Level Summary

Monitoring Location	Recorded Ambient dB(A) Leq	40-ton Haul Truck		
		Modeled Sound Level dB(A)	Modeled Ambient dB(A) Leq	Change from Recorded Ambient dB(A)
M-1	56.7	44	-	-
M-2	40.8	20	-	-
M-3	61.2	33	-	-
M-4	40.9	33	-	-
M-5	34.7	60	37.9	3.2

5.0 SUMMARY & CONCLUSIONS

UCI is proposing to operate a projectile testing range for use in supporting research and development operations. Testing will only occur on weekdays, between the hours of 10:00 a.m. and 4:00 p.m. No more than two shots will be fired in one day. Forty-four residential receptors, and five parcels of NYS Land identified as Wild Forest fall within the Project Area (Figure 1). Sound level monitoring was conducted at five monitoring locations on December 20, 2022, and December 21, 2022, to determine ambient sound levels within the Project Area. Potential significant sources of sound associated with the project are the testing of the 155 mm howitzer and operation of 40-ton haul truck along the site access road to transport the 155 mm howitzer and monitoring equipment to the firing pad.

Two sound propagation models, with and without the Sound Mitigation Berm, were developed to evaluate the impulse sound level produced by the Sound Source (barrel of the M109, 155mm howitzer) within the Project Area (Figure 3 & 4). The effect of the modeled impulse sound level on ambient sound levels from each monitoring location is discussed in Section 4.5.1 and summarized in Table 4b & Table 4c. An additional sound propagation model was developed to evaluate the sound levels produced by a 40-ton Haul Truck operating along the access road to the site. The effect of the modeled sound level on ambient sound levels from each monitoring location is discussed in Section 4.5.2 and summarized in Table 5a & Table 5b.

The modeled sound level for the 40-ton Haul Truck operating along the access road to the site is well below the recorded ambient sound levels at M-1, M2, M3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 5). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 1 & 4) shows a modeled sound level of 60 dB(A), and a modeled ambient sound level of 37.9 dB(A) a 3.2 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

The modeled change in ambient sound level from two shots of the Sound Source (barrel of the M109, 155 howitzer) without the Sound Mitigation Berm is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identify residential receptors (Table 4b &Table 4c). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 3) shows a modeled impulse sound level of 107 dB(A) at M-5, and a modeled ambient sound level of 66.7 dB(A) a 32.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022.

In addition to the mitigative measures currently proposed (remote location of Site / natural topographic rise between Sound Source and Residential Receptors) UCI is proposing to construct a Sound Mitigation Berm. The modeled change in ambient sound level from two shots of the Sound Source (barrel of the M109, 155 howitzer) with the Sound Mitigation Berm is below 3 dB at M-1, M-2, M-3, and M-4 indicating no appreciable change to ambient sound levels at all identified residential receptors (Table 4b &Table 4c). No appreciable change to ambient sound levels at four of the five NYS Land parcels identified as Wild Forest is anticipated. The parcel of Wild Forest (R-45) adjacent to the Firing Pad (Figure 2 & 4) shows a modeled impulse sound level of 100 dB(A) at M-5, and a modeled ambient sound level of 59.7 dB(A) a 25.0 dB(A) change in sound levels from the 34.7 dB(A) recorded ambient on December 21, 2022. The modeled impulse sound level at the property corner of the Wild Forest (R-45) parcel is 102 dB(A), and a modeled ambient sound level of 61.7 dB(A).

There are no structures identified, public trails on or means of public access to R-45. In reviewing surrounding land uses three currently permitted hard rock mining operations exist within a 2.1-mile radius of the Site. In addition, one of the currently permitted mining operations is adjacent to lands classified as Wilderness. Lands classified as Wilderness are less impacted by human use than lands classified as State Forest. Hard rock mining operations require regular blasting as part of their weekly operations, under the mines NYSDEC Mine Land Reclamation Permit an air blast limit of 133 dB measured to the closest structure outside the permit area is permitted. The closest Structure to the Firing pad is the Pulsifer residents (R-1) 5,200 ft. with a modeled impulse sound level implementing the Sound Mitigation Berm of 101 dB / 69 dB(A).

Based on the information presented in this report the proposed project does not pose a potentially significant environmental impact due to an increase in sound levels at receptors in the area.

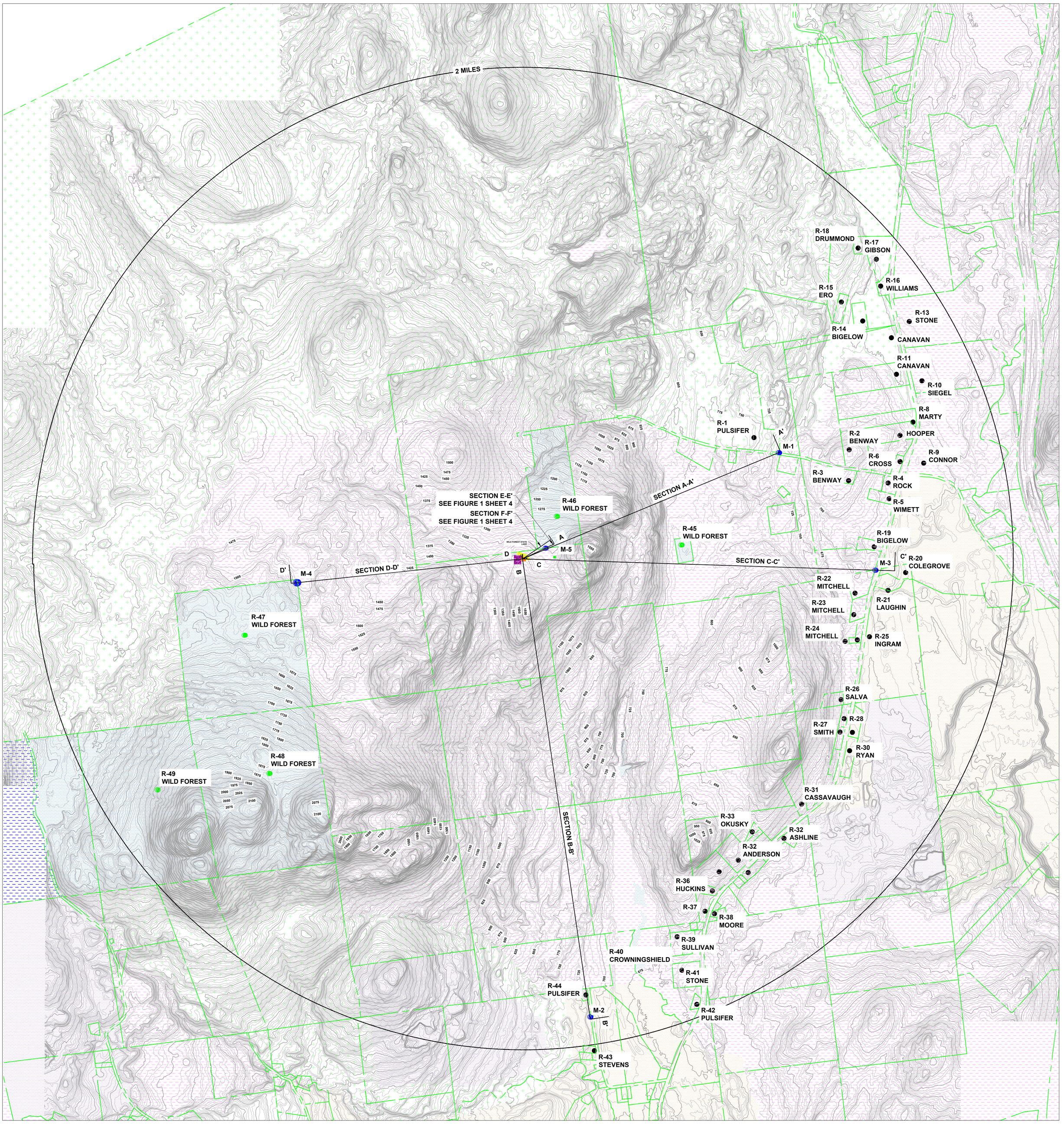
FIGURES

957

FIGURE 1 –SITE OVERVIEW MAP

958

958



LEGEND:

- PROPERTY LINES
- SOUND LEVEL MONITORING LOCATIONS
- RECEPTOR - WILD FOREST
- RESIDENTIAL RECEPTOR
- APA LAND CLASS - INDUSTRIAL USE
- APA LAND CLASS - MODERATE INTENSITY
- APA LAND CLASS - RURAL USE
- NYSDEC LAND CLASS - WILDERNESS FOREST
- NYSDEC LAND CLASS - RESOURCE MANAGEMENT
- NYSDEC LAND CLASS - WILD FOREST
- CONTROL OPERATION AREA
- FIRING PAD
- PROPOSED 13 FT BERM
- TARGET AREA

SCALE IN FEET
0 500 1000 2000

N

DRAWING NOTES:

1. CONTOUR INTERVAL = 5' MINOR, 25' MAJOR.
2. HORIZONTAL DATUM: NAD83 STATE PLAN, NEW YORK EAST, FEET
   VERTICAL DATUM: NAVD88, FEET AMSL
3. TOPOGRAPHY BASED ON NYS CLEARINGHOUSE 2017 METADATA. THE ON AERIAL IMAGERY IS FROM THE NYS CLEARINGHOUSE WEBSITE.
4. PROPERTY LINE BY PROVIDED FROM THE ESSEX COUNTY TAX PARCELS.

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DATE :	11-11-2024

SITE OVERVIEW MAP

UNCONVENTIONAL CONCEPTS, INC.

TOWN OF LEWIS — ESSEX COUNTY, NY

BOWMAN CONSULTING, ENGINEERING, LAND SURVEYING AND LANDSCAPE ARCHITECTURE

FIGURE 1

SHEET 01 OF 05

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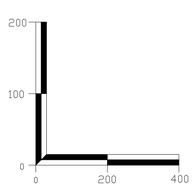
APA CLASS LAND - RURAL | NYSDEC - WILD FOREST | SECTION A-A' | APA CLASS LAND - RURAL

PL | PL | PL | M-1 | PL



LEGEND:

- PROPERTY LINES
- SOUND LEVEL MONITORING LOCATIONS
- RESIDENTIAL RECEPTOR
- APA LAND CLASS - MODERATE INTENSITY
- APA LAND CLASS - RURAL USE
- NYSDEC LAND CLASS - WILD FOREST
- CONTROL OPERATION AREA
- FIRING PAD
- PROPOSED 13 FT BERM



HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 100'

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SITE OVERVIEW MAP - SECTIONS

UNCONVENTIONAL CONCEPTS, INC.

TOWN OF LEWIS — ESSEX COUNTY, NY

BOWMAN CONSULTING, ENGINEERING, LAND SURVEYING AND LANDSCAPE ARCHITECTURE

FIGURE 1

SHEET 02 OF 05

960

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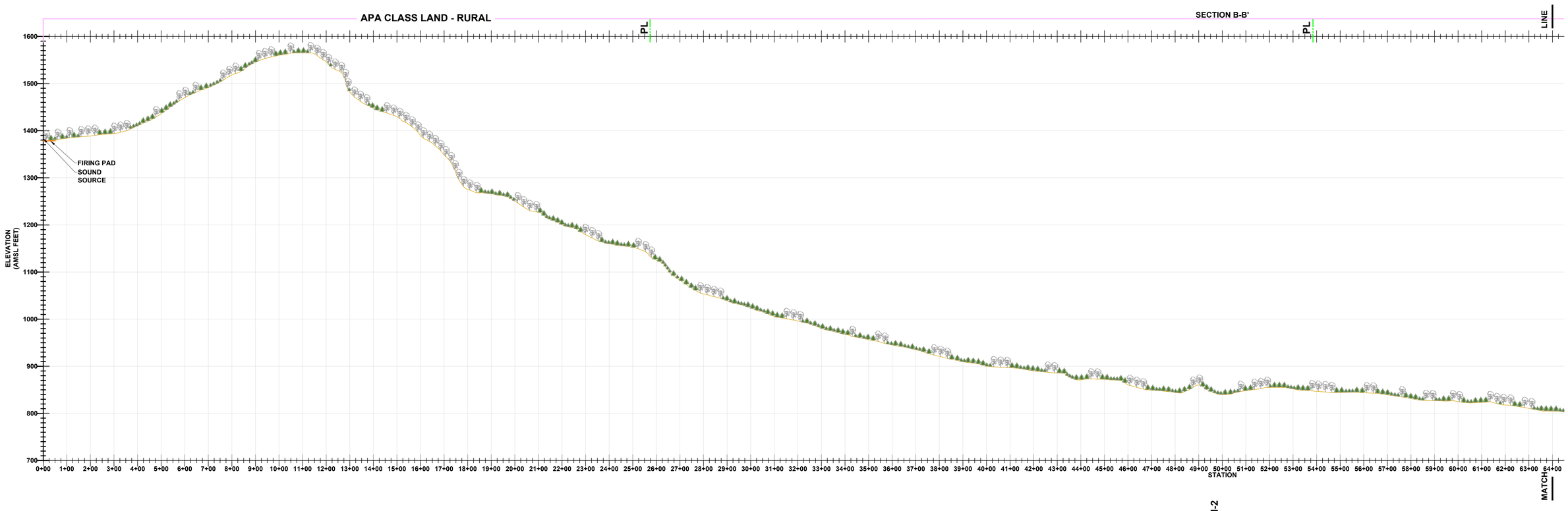
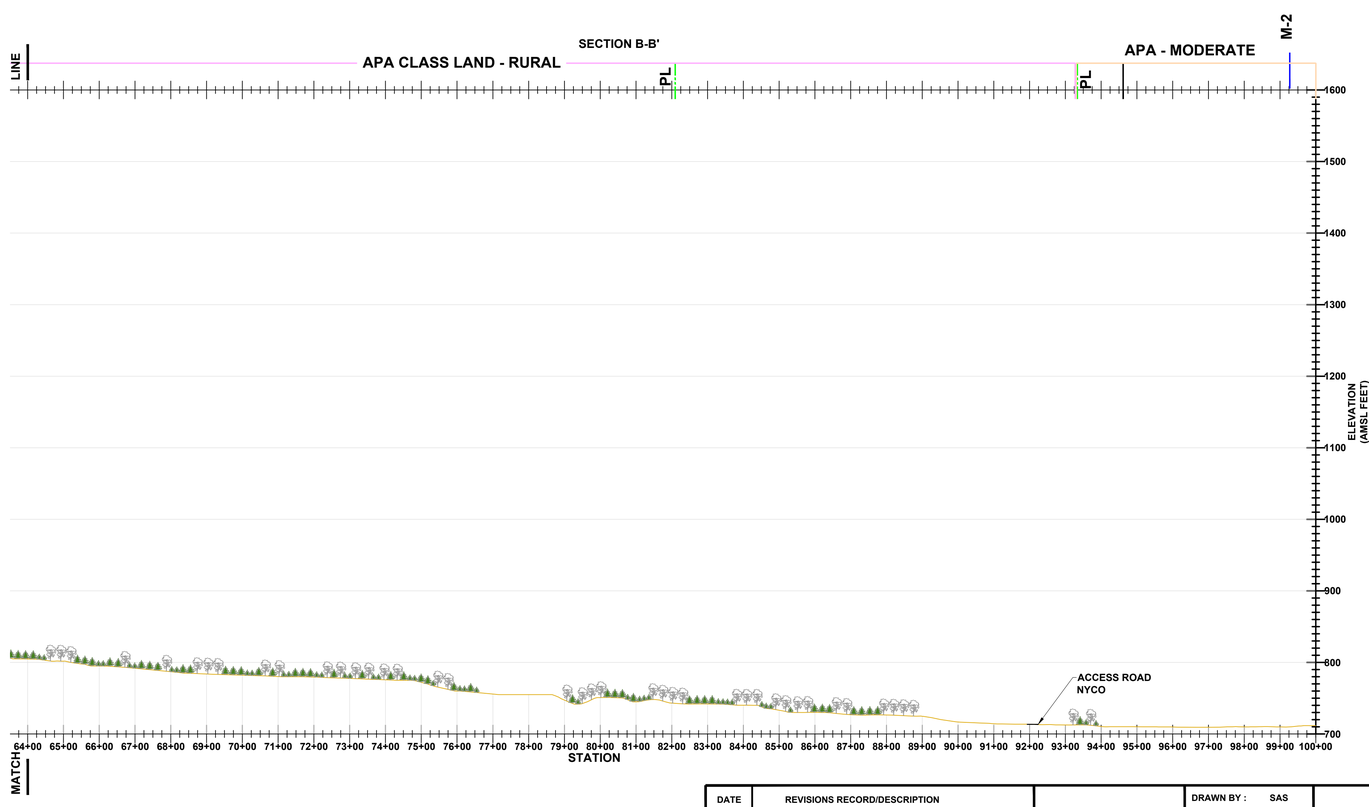
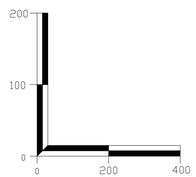




LEGEND:

- PROPERTY LINES
- SOUND LEVEL MONITORING LOCATIONS
- RESIDENTIAL RECEPTOR
- APA LAND CLASS - MODERATE INTENSITY
- APA LAND CLASS - RURAL USE
- NYSDEC LAND CLASS - WILD FOREST
- CONTROL OPERATION AREA
- FIRING PAD
- PROPOSED 13 FT BERM



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VERTICAL SCALE: 1" = 100'

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SITE OVERVIEW MAP - SECTIONS

UNCONVENTIONAL CONCEPTS, INC.

TOWN OF LEWIS — ESSEX COUNTY, NY

BOWMAN CONSULTING, ENGINEERING, LAND SURVEYING AND LANDSCAPE ARCHITECTURE

FIGURE 1

SHEET 03 OF 05

961

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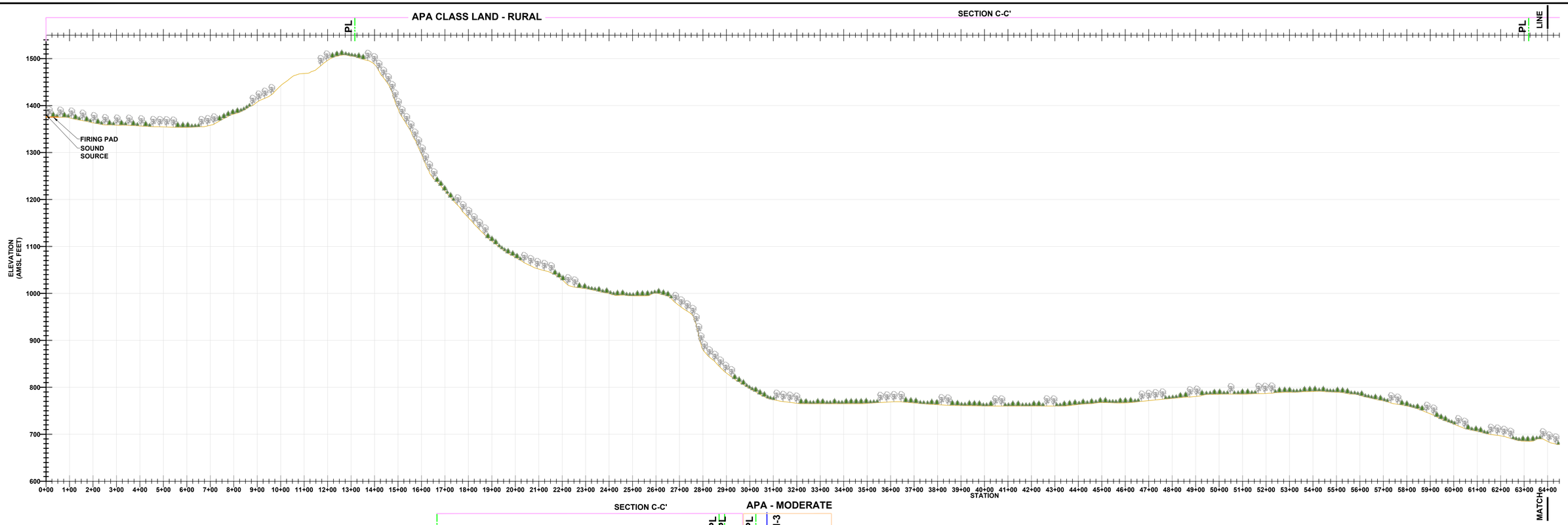
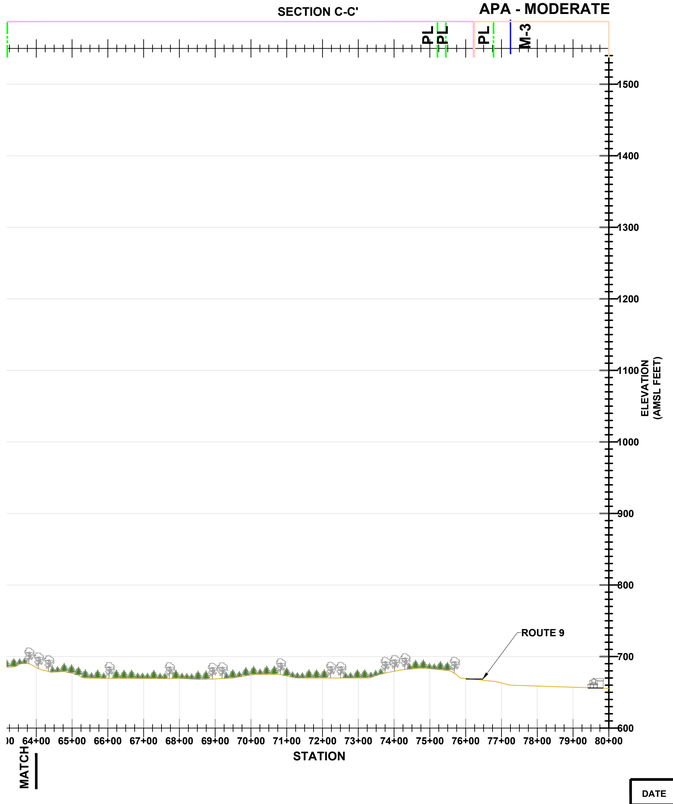
APA CLASS LAND - RURAL

SECTION C-C'



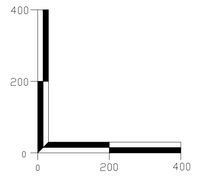
APA - MODERATE

SECTION C-C'



LEGEND:

- PROPERTY LINES
- SOUND LEVEL MONITORING LOCATIONS
- RESIDENTIAL RECEPTOR
- APA LAND CLASS - MODERATE INTENSITY
- APA LAND CLASS - RURAL USE
- NYSDEC LAND CLASS - WILD FOREST
- CONTROL OPERATION AREA
- FIRING PAD
- PROPOSED 13 FT BERM



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VERTICAL SCALE: 1" = 200'

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SITE OVERVIEW MAP - SECTIONS

UNCONVENTIONAL CONCEPTS, INC.

TOWN OF LEWIS — ESSEX COUNTY, NY

BOWMAN CONSULTING, ENGINEERING, LAND SURVEYING AND LANDSCAPE ARCHITECTURE

FIGURE 1

SHEET 04 OF 05

962

962

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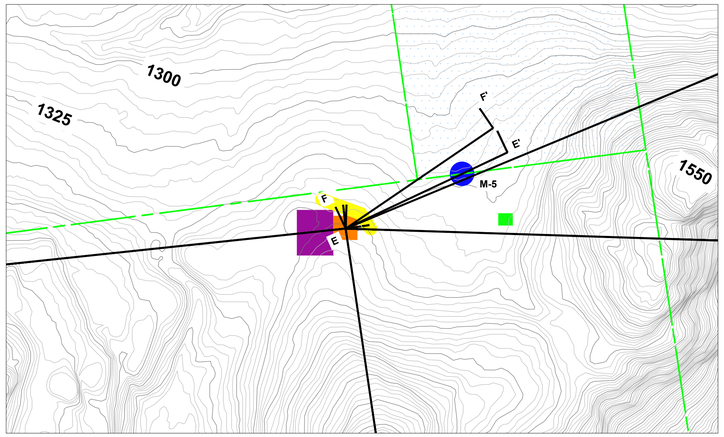
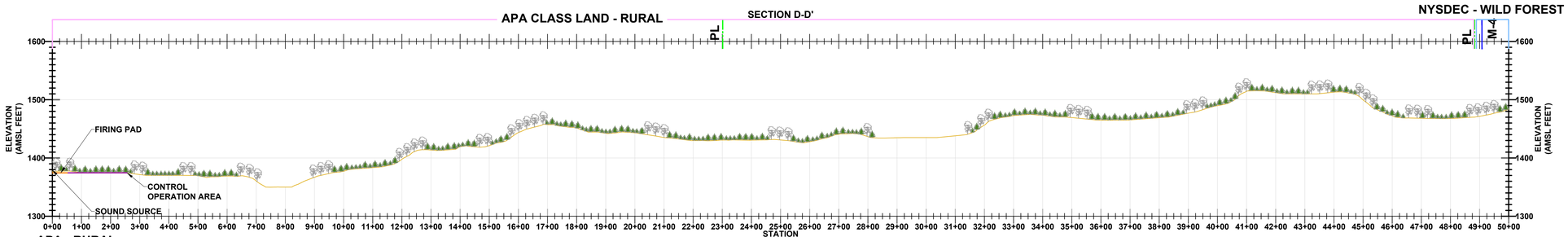
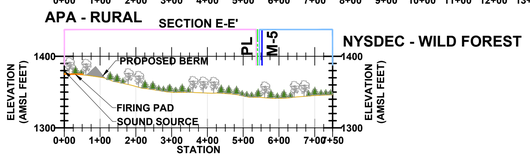
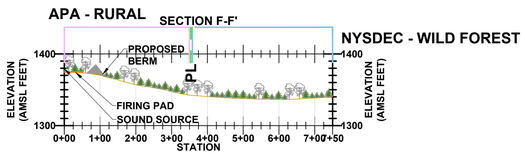


PLAN VIEW
SECTIONS E-E' & F-F'
SCALE: 1" = 300'

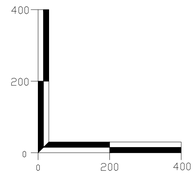






LEGEND:

- PROPERTY LINES
- SOUND LEVEL MONITORING LOCATIONS
- RESIDENTIAL RECEPTOR
- APA LAND CLASS - MODERATE INTENSITY
- APA LAND CLASS - RURAL USE
- NYSDEC LAND CLASS - WILD FOREST
- CONTROL OPERATION AREA
- FIRING PAD
- PROPOSED 13 FT BERM



HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 200'

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SITE OVERVIEW MAP - SECTIONS

UNCONVENTIONAL CONCEPTS, INC.

TOWN OF LEWIS — ESSEX COUNTY, NY

BOWMAN CONSULTING, ENGINEERING, LAND SURVEYING AND LANDSCAPE ARCHITECTURE

FIGURE 1

SHEET 05 OF 05

963

963

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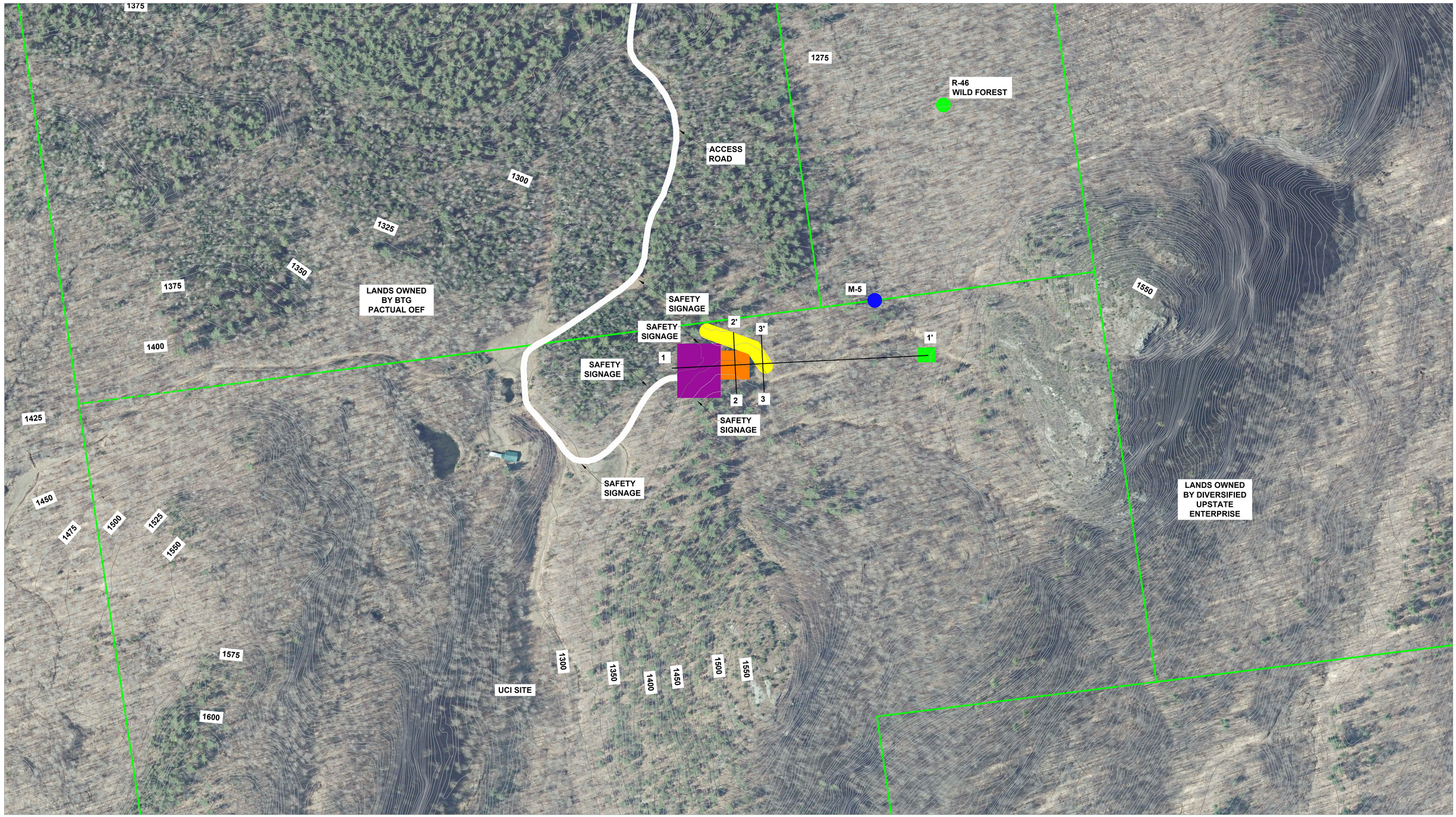
FIGURE 2 – SITE MAP

964



LEGEND:

- PROPERTY LINES
- MONITORING LOCATION PROPOGATED SOUND LEVEL
- RECEPTOR - WILD FOREST
- CONTROL OPERATION AREA
- FIRING PAD
- PROPOSED 13 FT BERM
- TARGET AREA

SCALE IN FEET
0 75 150 300

N

DRAWING NOTES:

1. CONTOUR INTERVAL = 5' MINOR, 25' MAJOR.
2. HORIZONTAL DATUM: NAD83 STATE PLAN, NEW YORK EAST, FEET
   VERTICAL DATUM: NAVD88, FEET AMSL
3. TOPOGRAPHY BASED ON NYS CLEARINGHOUSE 2017 METADATA. THE ON AERIAL IMAGERY IS FROM THE NYS CLEARINGHOUSE WEBSITE.
4. PROPERTY LINE BY PROVIDED FROM THE ESSEX COUNTY TAX PARCELS.

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THIS DRAWING IS NOT TO BE USED FOR ENGINEERING PURPOSES

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PROJ. NO :	362.00
SCALE :	AS SHOWN
DATE :	11-11-2024

SITE MAP

UNCONVENTIONAL CONCEPTS, INC.

TOWN OF LEWIS — ESSEX COUNTY, NY

Bowman
179 RIVER ST.
TROY, NY 12180
(518) 270-1620
WWW.BOWMAN.COM

FIGURE 2

SHEET 01 OF 02

965

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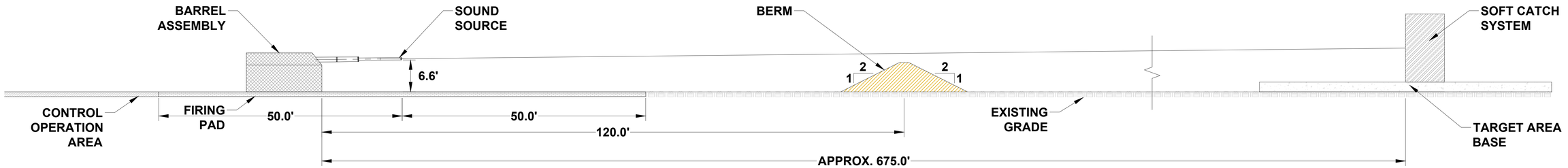
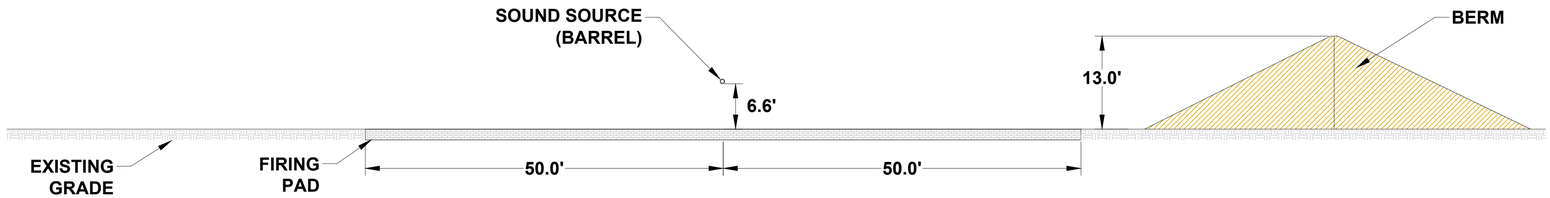


SECTION 1-1'



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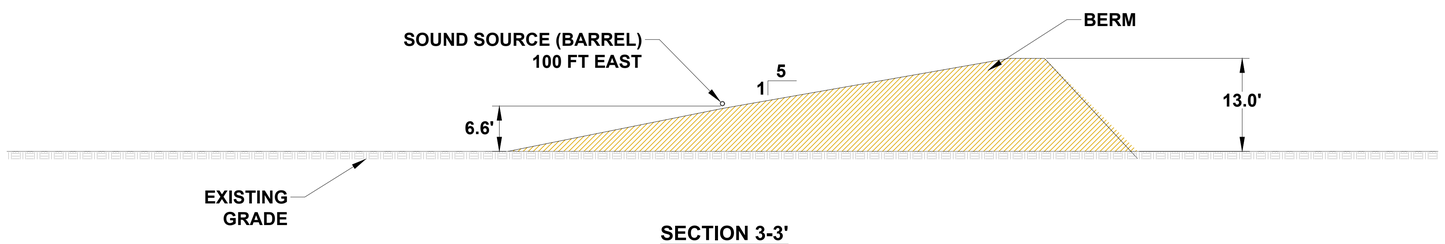

SECTION 3-3'

DRAWING NOTES:
1. CONTOUR INTERVAL = 5' MINOR, 25' MAJOR.

2. HORIZONTAL DATUM: NAD83 STATE PLAN, NEW YORK EAST, FEET
VERTICAL DATUM: NAVD88, FEET AMSL

3. TOPOGRAPHY BASED ON NYS CLEARINGHOUSE 2017 METADATA. THE ON AERIAL IMAGERY IS FROM THE NYS CLEARINGHOUSE WEBSITE.

4. PROPERTY LINE BY PROVIDED FROM THE ESSEX COUNTY TAX PARCELS.

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SITE MAP - SECTIONS

UNCONVENTIONAL CONCEPTS, INC.

TOWN OF LEWIS — ESSEX COUNTY, NY

BOWMAN CONSULTING, ENGINEERING, LAND SURVEYING AND LANDSCAPE ARCHITECTURE

FIGURE 2

SHEET 02 OF 02

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FIGURE 3 – SOUND PROPAGATION MAP
NO SOUND MITIGATION BERM

967

FIGURE 3 - SOUND PROPOGATION MAP
NO SOUND MITIGATION BERM

225000 m

615000 m

615000 m

N

2 miles

R-17
Gibson

R-18
Drummond

R-16
Williams

R-15
Ero

R-14
Bigelow

R-13
Stone

Canavan

R-10
Siegel

R-11
Canavan

R-8
Marty

Hooper

R-1
Pulsifer

M-1 75 dB(A)

R-2
Benway

R-6
Cross

R-9
Connor

R-3
Benway

R-4
Rock

R-5
Wimett

R-46
Wild Forest

M-5 107dB(A)

Sound Source

R-45
Wild Forest

R-19
Bigelow

M-3 73 dB(A)

R-20
Colegrove

R-22
Mitchell

M-4 79 dB(A)

R-21
Laughin

R-47
Wild Forest

R-23
Mitchell

R-25
Ingram

R-24
Mitchell

610000 m

R-26
Salva

610000 m

R-28

R-27
Smith

R-30
Ryan

R-48
Wild Forest

R-49
Wild Forest

R-31
Cassavaugh

R-33
OKusky

R-32
Ashline

R-34
Anderson

R-36
Huckins

R-37

R-38
Moore

R-39
Sullivan

R-40
Crowningshield

R-41
Stone

R-44
Pulsifer

R-42
Pulsifer

M-2 71 dB(A)

R-43
Stevens

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 45 DB(A) Sound Pressure Level
- 50 DB(A) Sound Pressure Level
- 55 DB(A) Sound Pressure Level
- 60 DB(A) Sound Pressure Level
- 65 DB(A) Sound Pressure Level
- 70 DB(A) Sound Pressure Level
- 75 DB(A) Sound Pressure Level
- 80 DB(A) Sound Pressure Level
- 85 DB(A) Sound Pressure Level
- 90 DB(A) Sound Pressure Level
- 95 DB(A) Sound Pressure Level
- 100 DB(A) Sound Pressure Level
- 105 DB(A) Sound Pressure Level
- 110 DB(A) Sound Pressure Level
- 115 DB(A) Sound Pressure Level
- 120 DB(A) Sound Pressure Level
- 125 DB(A) Sound Pressure Level
- 130 DB(A) Sound Pressure Level
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

968

225000 m

968

FIGURE 4 – SOUND PROPAGATION MAP
13FT. SOUND MITIGATION BERM INSTALLED

969

FIGURE 4 - SOUND PROPOGATION MAP
13FT. SOUND MITIGATION BERM INSTALLED

615000 m

225000 m

N

2 miles

R-17 Gibson
R-18 Drummond
R-16 Williams
R-15 Ero
R-14 Bigelow
R-13 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-8 Marty
Hooper
R-1 Pulsifer
R-2 Benway
M-1 67 dB(A)
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-46 Wild Forest
R-45 Wild Forest
M-5 100dB(A)
Sound Source
R-19 Bigelow
M-3 73 dB(A)
R-20 Colegrove
R-22 Mitchell
M-4 79 dB(A)
R-21 Laughin
R-47 Wild Forest
R-23 Mitchell
R-25 Ingram
R-24 Mitchell
R-26 Salva
R-28
R-27 Smith
R-30 Ryan
R-48 Wild Forest
R-49 Wild Forest
R-31 Cassavaugh
R-33 OKusky
R-32 Ashline
R-34 Anderson
R-36 Huckins
R-38 Moore
R-37
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-44 Pulsifer
R-42 Pulsifer
M-2 71 dB(A)
R-43 Stevens

610000 m

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 50 DB(A) Sound Pressure Level
- 55 DB(A) Sound Pressure Level
- 60 DB(A) Sound Pressure Level
- 65 DB(A) Sound Pressure Level
- 70 DB(A) Sound Pressure Level
- 75 DB(A) Sound Pressure Level
- 80 DB(A) Sound Pressure Level
- 85 DB(A) Sound Pressure Level
- 90 DB(A) Sound Pressure Level
- 95 DB(A) Sound Pressure Level
- 100 DB(A) Sound Pressure Level
- 105 DB(A) Sound Pressure Level
- 110 DB(A) Sound Pressure Level
- 115 DB(A) Sound Pressure Level
- 120 DB(A) Sound Pressure Level
- 125 DB(A) Sound Pressure Level
- 130 DB(A) Sound Pressure Level
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

970

225000 m

970

FIGURE 5 – SOUND PROPAGATION MAP
HAUL TRUCK

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FIGURE 5 - SOUND PROPOGATION MAP
HAUL TRUCK

615000 m

225000 m

N

2 miles

R-17 Gibson
R-18 Drummond
R-16 Williams
R-15 Ero
R-14 Bigelow
R-13 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-8 Marty
Hooper
R-1 Pulsifer
M-1 44 dB(A)
R-2 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
Sound Source
Access Road To Site
R-46 Wild Forest
R-45 Wild Forest
R-19 Bigelow
M-5 60 dB(A)
Sound Source
Sound Source
R-20 Colegrove
M-3 33 dB(A)
M-4 33 dB(A)
R-22 Mitchell
R-21 Laughin
R-47 Wild Forest
R-23 Mitchell
R-24 Mitchell
R-25 Ingram
R-26 Salva
R-28
R-27 Smith
R-30 Ryan
R-48 Wild Forest
R-49 Wild Forest
R-31 Cassavaugh
R-33 OKusky
R-32 Ashline
R-34 Anderson
R-36 Huckins
R-37
R-38 Moore
R-39 Sullivan
R-40 Crowningshield
R-41 Stone
R-44 Pulsifer
R-42 Pulsifer
M-2 20 dB(A)
R-43 Stevens

610000 m

LEGEND

- APA Land Class - Industrial Use
- APA Land Class - Low Intensity
- APA Land Class - Moderate Intensity
- APA Land Class - Rural Use
- Control Operation Area
- Firing Pad
- NYSDEC Land Class - Resource Management
- NYSDEC Land Class - Wild Forest
- NYSDEC Land Class - Wilderness
- Property Bondary
- Surface Water
- Target Area
- Two Mile Radius from Firing Pad
- 20 dB(A) Sound Pressure Level
- 25 dB(A) Sound Pressure Level
- 30 dB(A) Sound Pressure Level
- 35 dB(A) Sound Pressure Level
- 40 dB(A) Sound Pressure Level
- 45 dB(A) Sound Pressure Level
- 50 dB(A) Sound Pressure Level
- 55 dB(A) Sound Pressure Level
- 60 dB(A) Sound Pressure Level
- 65 dB(A) Sound Pressure Level
- 70 dB(A) Sound Pressure Level
- 75 dB(A) Sound Pressure Level
- 80 dB(A) Sound Pressure Level
- 85 dB(A) Sound Pressure Level
- acess road to site
- Monitoring Location Propogated Sound Level
- Receptor - Wild Forest
- Residential Receptor
- Sound Source

0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft

972

225000 m

972

TABLE 3 – Sound Propagation Model Comparison to Straight-line Projection Method

Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Receiver Name	Source Name	Distance to source (m)	Frequency (Hz)	Sound Power Level dB	Distance Attenuation db	Atmospheric Absorption dB	Ground Effect dB	Barrier Attenuation dB (total)	A - Weighting dB	Modeled Sound Pressure Level dB(A)	Modeled Sound Pressure Level Distance Attenuation + Weighting Only dB(A)	Total Modeled Sound Pressure Level dB(A)	Total Modeled Sound Pressure Level Distance Attenuation + Weighting Only dB(A)	Straight-line projection Sound Pressure Levels dB(A)
M-1	155 mm Howitzer Barrel Assembly	1815	31.5	179.1	-76.2	0.0	5.8	-10.3	-39.4	59.1	63.5	67	87	87
		1815	63	175.3	-76.2	-0.2	5.8	-12.7	-26.2	65.9	72.9			
		1815	125	164.5	-76.2	-0.6	-5.5	-9.8	-16.1	56.3	72.2			
		1815	250	149.1	-76.2	-2.1	-7.4	-10.8	-8.6	44.1	64.3			
		1815	500	160	-76.2	-5.1	-3.3	-17.8	-3.2	54.5	80.6			
		1815	1000	158.7	-76.2	-9.0	1.2	-24.0	0.0	50.7	82.5			
		1815	2000	155.2	-76.2	-16.4	1.8	-25.0	1.2	40.6	80.2			
		1815	4000	151.9	-76.2	-41.6	1.8	-25.0	1.0	11.9	76.7			
		1815	8000	147.6	-76.2	-139.1	1.8	-25.0	-1.1	-92.0	70.3			
		1815	16000	144.9	-76.2	-501.5	1.8	-25.0	-6.6	-462.6	62.1			
M-2	155 mm Howitzer Barrel Assembly	3026	31.5	179.1	-80.6	-0.1	5.9	-4.8	-39.4	60.1	59.1	71	83	83
		3026	63	175.3	-80.6	-0.3	5.9	-4.9	-26.2	69.3	68.5			
		3026	125	164.5	-80.6	-1.0	-5.5	0.0	-16.1	61.3	67.8			
		3026	250	149.1	-80.6	-3.4	-7.4	0.0	-8.6	49.1	59.9			
		3026	500	160	-80.6	-8.5	-3.3	-2.2	-3.2	62.3	76.2			
		3026	1000	158.7	-80.6	-15.1	1.2	-6.0	0.0	58.2	78.1			
		3026	2000	155.2	-80.6	-27.3	1.8	-6.9	1.2	43.3	75.8			
		3026	4000	151.9	-80.6	-69.3	1.8	-8.4	1.0	-3.7	72.3			
		3026	8000	147.6	-80.6	-231.8	1.8	-10.3	-1.1	-174.5	65.9			
		3026	16000	144.9	-80.6	-835.8	1.8	-12.7	-6.6	-789.0	57.7			
M-3	155 mm Howitzer Barrel Assembly	2355	31.5	179.1	-78.44	-0.1	5.9	-5.0	-39.4	62.1	61.3	73	85	85
		2355	63	175.3	-78.44	-0.2	5.9	-5.1	-26.2	71.2	70.7			
		2355	125	164.5	-78.44	-0.8	-5.5	0.0	-16.1	63.7	70.0			
		2355	250	149.1	-78.44	-2.7	-7.4	0.0	-8.6	52.0	62.1			
		2355	500	160	-78.44	-6.6	-3.3	-3.8	-3.2	64.7	78.4			
		2355	1000	158.7	-78.44	-11.7	1.2	-8.5	0.0	61.2	80.3			
		2355	2000	155.2	-78.44	-21.2	1.8	-10.5	1.2	48.0	78.0			
		2355	4000	151.9	-78.44	-54.0	1.8	-12.9	1.0	9.4	74.5			
		2355	8000	147.6	-78.44	-180.5	1.8	-15.6	-1.1	-126.2	68.1			
		2355	16000	144.9	-78.44	-650.6	1.8	-18.4	-6.6	-607.4	59.9			
M-4	155 mm Howitzer Barrel Assembly	1496	31.5	179.1	-74.6	0.0	5.8	-4.8	-39.4	66.1	65.1	79	89	89
		1496	63	175.3	-74.6	-0.1	5.8	-4.8	-26.2	75.4	74.5			
		1496	125	164.5	-74.6	-0.5	-5.5	0.0	-16.1	67.8	73.8			
		1496	250	149.1	-74.6	-1.7	-7.4	0.0	-8.6	56.8	65.9			
		1496	500	160	-74.6	-4.2	-3.3	-1.5	-3.2	73.2	82.2			
		1496	1000	158.7	-74.6	-7.5	1.2	-4.8	0.0	73.0	84.1			
		1496	2000	155.2	-74.6	-13.7	1.7	-4.8	1.2	65.1	81.8			
		1496	4000	151.9	-74.6	-34.7	1.7	-4.8	1.0	40.6	78.3			
		1496	8000	147.6	-74.6	-116.0	1.7	-4.8	-1.1	-47.2	71.9			
		1496	16000	144.9	-74.6	-418.3	1.7	-4.8	-6.6	-357.7	63.7			

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M-5	**155 mm Howitzer Barrel Assembly**	170	31.5	179.1	-55.6	0.0	4.1	-4.9	-39.4	83.4	84.1	**100**	**108**	**108**
		170	63	175.3	-55.6	0.0	4.1	-5.0	-26.2	92.7	93.5			
		170	125	164.5	-55.6	-0.1	-0.4	-4.8	-16.1	87.6	92.8			
		170	250	149.1	-55.6	-0.2	-7.6	0.0	-8.6	77.1	84.9			
		170	500	160	-55.6	-0.5	-3.6	-2.6	-3.2	94.5	101.2			
		170	1000	158.7	-55.6	-0.9	0.7	-7.3	0.0	95.7	103.1			
		170	2000	155.2	-55.6	-1.5	1.2	-8.8	1.2	91.7	100.8			
		170	4000	151.9	-55.6	-3.9	1.2	-10.9	1.0	83.7	97.3			
		170	8000	147.6	-55.6	-13.0	1.2	-13.4	-1.1	65.8	90.9			
		170	16000	144.9	-55.6	-46.9	1.2	-16.1	-6.6	21.0	82.7			
Wild Forest Property Corner (R-46)	**155 mm Howitzer Barrel Assembly**	107	31.5	179.1	-51.5	0.0	3.0	-5.0	-39.4	86.2	88.2	**102**	**112**	**112**
		107	63	175.3	-51.5	0.0	3.0	-5.3	-26.2	95.3	97.6			
		107	125	164.5	-51.5	0.0	-0.3	-5.4	-16.1	91.1	96.9			
		107	250	149.1	-51.5	-0.1	-7.1	0.0	-8.6	81.8	89.0			
		107	500	160	-51.5	-0.3	-3.5	-4.5	-3.2	97.0	105.3			
		107	1000	158.7	-51.5	-0.5	0.4	-9.9	0.0	97.2	107.2			
		107	2000	155.2	-51.5	-1.0	0.9	-12.2	1.2	92.6	104.9			
		107	4000	151.9	-51.5	-2.4	0.9	-14.8	1.0	85.0	101.4			
		107	8000	147.6	-51.5	-8.1	0.9	-17.6	-1.1	70.1	95.0			
		107	16000	144.9	-51.5	-29.3	0.9	-20.0	-6.6	38.4	86.8			

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APPENDICES

APPENDIX A –
NYSDEC – ASSESSING AND MITIGATING NOISE IMPACTS

Assessing and Mitigating Noise Impacts

New York State
Department of Environmental Conservation

PROGRAM POLICY	Department ID: DEP-00-1	Program ID: n/a
Issuing Authority: Environmental Conservation Law Articles 3, 8, 23, 27 Name: Jeffrey Sama Title: Director Signature: /S/ Date: 10/6/00 Issuance Date: October 6, 2000 Revised: February 2, 2001	**Originating Unit: Division of Environmental Permits** Office/Division: Environmental Permits Unit: Phone: (518) 402-9167 Latest Review Date (Office Use):	

Abstract: Facility operations regulated by the Department of Environmental Conservation located in close proximity to other land uses can produce sound that creates significant noise impacts for proximal sound receptors. This policy and guidance presents noise impact assessment methods, examines the circumstances under which sound creates significant noise impacts, and identifies avoidance and mitigative measures to reduce or eliminate noise impacts.

Related References: See references pages 27 and 28.

I. PURPOSE[1]

This policy is intended to provide direction to the staff of the Department of Environmental Conservation for the evaluation of sound levels and characteristics (such as pitch and duration) generated from proposed or existing facilities. This guidance also serves to identify when noise levels may cause a significant environmental impact and gives methods for noise impact assessment, avoidance, and reduction measures. These methods can serve as a reference to applicants preparing environmental assessments in support of an application for a permit. Additionally, this guidance explains the Department's regulatory authority for undertaking noise evaluations and for imposing conditions for noise mitigation measures in the agency's approval

[1] A Program Policy Memorandum is designed to provide guidance and clarify program issues for Division staff to ensure compliance with statutory and regulatory requirements. It provides assistance to New York State Department of Environmental Conservation (DEC) staff and the regulated community in interpreting and applying regulations and statutes to assure that program uniformity is attained throughout the State. Nothing set forth in a Program Policy Memorandum prevents DEC staff from varying from that guidance as specific circumstances may dictate, provided the staff's actions comply with applicable statutory and regulatory requirements. As this guidance document is not a fixed rule, it does not create any enforceable right by any party using the Program Policy Memorandum.

of permits for various types of facilities pursuant to regulatory program regulations and the State Environmental Quality Review Act (SEQR).

II. BACKGROUND

Noise is defined as any loud, discordant or disagreeable sound or sounds. More commonly, in an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by proposed or existing facilities may become noise due to land use surrounding the facility. When lands adjoining an existing or proposed facility contain residential, commercial, institutional or recreational uses that are proximal to the facility, noise is likely to be a matter of concern to residents or users of adjacent lands.

A. Sources of Noise Generation

The three major categories of noise sources associated with facilities are (1) fixed equipment or process operations; (2) mobile equipment or process operations; and (3) transport movements of products, raw material or waste. The fixed plant may include a very wide range of equipment including: generators; pumps; compressors; crushers of plastics, stone or metal; grinders; screens; conveyers; storage bins; or electrical equipment. Mobile operations may include: drilling; haulage; pug mills; mobile treatment units; and service operations. Transport movements may include truck traffic within the operation, loading and unloading trucks and movement in and out of the facility. Any or all of these activities may be in operation at any one time. Singular or multiple effects of sound generation from these operations may constitute a potential source of noise.

B. Potential for Adverse Impacts

Numerous environmental factors determine the level or perceptibility of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; time of day; wind direction; temperature gradient; and relative humidity. The characteristics of a sound are also

important determining factors for considering it as noise. The amplitude (loudness), frequency (pitch), impulse patterns and duration of sound all affect the potential for a sound to be a noise. The combination of sound characteristics, environmental factors and the physical and mental sensitivity of a receptor to a sound determine whether or not a sound will be perceived as a noise. This guidance uses these factors in assessing the presence of noise and the significance of its impacts. It relies upon qualitative and quantitative sound evaluation techniques and sound pressure level impact modeling presented in accepted references on the subject.

C. Mitigation

Mitigation refers to actions that will be taken to reduce the effects of noise or the noise levels on a receptor. Adverse noise effects generated by a facility can be avoided or reduced at the point of generation thereby diminishing the effects of the noise at the point of reception. This guidance identifies various mitigation techniques and their proper application either at the source of noise generation or on a facility's property. Alternative construction or operational methods, equipment maintenance, selection of alternative equipment, physical barriers, siting of activities, set backs, and established hours of construction or operation, are among the techniques that can successfully avoid or reduce adverse noise effects.

D. Decision Making

When an assessment of the potential for adverse noise impacts indicates the need for noise mitigation, it is preferred that specifications for such measures be incorporated in a noise analysis and in the applicant's work or operational plan necessary for a complete application. Presenting a plan that incorporates effective noise mitigation provisions facilitates the Department's technical and environmental review and minimizes or negates the imposition of permit conditions by the Department. Adherence to these plans becomes a condition of a permit.

Noise avoidance and mitigation measures may also be imposed directly as conditions of permit issuance. This guidance will review the statutory authority under which the Department can require the mitigation of noise effects.

III. POLICY

In the review of an application for a permit, the Department of Environmental Conservation is to evaluate the potential for adverse impacts of sound generated and emanating to receptors outside of the facility or property. When a sound level evaluation indicates that receptors may experience sound levels or characteristics that produce significant noise impacts or impairment of property use, the Department is to require the permittee or applicant to employ reasonable and necessary measures to either eliminate or mitigate adverse noise effects. Options to be used to fulfill this guidance should be implemented within the existing regulatory and environmental review framework of the agency.

Regulatory authority for assessing and controlling noise effects are contained in both SEQR and specific Department program regulations. Specific regulatory references are as follows:

Section 3-0301(1)(i) of the Environmental Conservation Law (ECL) states that the commissioner shall have the power to: "i. Provide for prevention and abatement of all water, land and air pollution including but not limited to that related to particulates, gases, dust, vapors, noise, radiation, odor, nutrients and heated liquids."

To comply with Article 8 of the ECL and 6 NYCRR Part 617, State Environmental Quality Review Act, consideration of all relevant environmental issues must be undertaken in making a determination of environmental significance. Noise impact potential is one of many potential issues for consideration in a SEQR review.

Environmental Conservation Law (ECL) Article 23, Title 27, Mined Land Reclamation Law (MLRL), requires applicants for permits to prepare and submit a mined land use plan to the Department for approval. The plan must describe, "the applicant's mining method and measures

to be taken to minimize adverse environmental impacts resulting from the mining operation." The provisions to be incorporated in a Mined Land Use Plan, as specified in 6 NYCRR Section 422.2, include the control of noise as a component of the plan.

The solid waste regulations at 6 NYCRR Subdivision 360-1.14(p), establish A-weighted decibel levels that are not to be exceeded at the property line of a facility.

The Division of Air Resources has regulations in 6 NYCRR Parts 450 through 454 that regulate the allowable sound level limits on certain motor vehicles. The statutory authority for these regulations is found in the New York State Vehicle and Traffic Law, Article 10, Section 386.

This guidance does not supercede any local noise ordinances or regulations.

IV. RESPONSIBILITY

The environmental analyst, acting as project manager for the review of applications for permits or permit modifications and working in concert with the program specialist, is responsible for ensuring that sound generation and noise emanating from proposed or existing facilities are properly evaluated. For new permits or significantly modified permits, there should be a determination as to the potential for noise impacts, and establishment of the requirements for noise impact assessment to be included in the application for permit. Where the Department is lead agency, the analyst is responsible for making a determination of significance pursuant to SEQR with respect to potential noise impacts and include documentation for such determination.

Where impacts are to be avoided or reduced through mitigation measures, the analyst, or where there are program requirements to address noise, the program specialist, should determine the effectiveness and feasibility of those measures and ensure that the permit conditions contain specific details for such measures. It should also be determined if additional measures to control noise are to be imposed as a condition of permitting. Appropriate permit language for the permit conditions should be developed by the program specialist and the analyst. The results of noise impact evaluations and the effectiveness of mitigation measures

shall be incorporated into SEQR documents and, where necessary, permit conditions shall be placed in final permits to ensure effective noise control.

When it is determined that potential noise effects, as well as other issues, warrant evaluation of impacts and mitigation measures in a Draft Environmental Impact Statement (EIS) prepared pursuant to SEQR, the environmental analyst with the Division of Environmental Permits assumes responsibility for determining the level of evaluation needed to assess sound level generation, noise effects, and mitigation needs and feasibility.

For existing facilities, the program specialist will determine the need for additional mitigation measures to control noise effects either in response to complaints or other changes in circumstances such as new noise from existing facilities or a change in land-use proximal to the facility.

The applicant or their agent, in preparing an application for a permit and supporting documentation, is responsible for assessing the potential noise impacts on area receptors. When potential adverse noise impacts are identified, the applicant should incorporate noise avoidance and reduction measures in the construction or operating plans. The applicant's submittal should also assess the effectiveness of proposed mitigation measures in eliminating adverse noise reception. Where noise effects are determined to be a reason in support of a SEQR positive declaration, the applicant shall assess noise impacts, avoidance, and mitigation measures in a Draft EIS using methodologies acceptable to this Department.

V. PROCEDURE

The intent of this section is to: introduce terms related to noise analyses; describe some of the various methods used to determine the impacts of sound pressure levels on receptors; identify some of the various attenuators of noise; and list some of the mitigative techniques that can be used to reduce the effects of noise on a receptor. At the end of the section three levels of analysis are described. The first level determines the potential for adverse noise impacts based on noise characteristics and sound pressure increases solely on noise attenuation over distance between the source and receptor of the noise. The second level factors other considerations such as topography and noise abatement measures in determining if adverse

noise impacts will occur. The third level evaluates noise abatement alternatives and their effectiveness in avoiding or reducing noise impacts.

The environmental effects of sound and human perceptions of sound can be described in terms of four characteristics:

1. Sound Pressure Level (SPL may also be designated by the symbol L_p) or perceived loudness is expressed in decibels (dB) or A-weighted decibel scale dB(A) which is weighted towards those portions of the frequency spectrum, between 20 and 20,000 Hertz, to which the human ear is most sensitive. Both measure sound pressure in the atmosphere.

2. Frequency (perceived as pitch), the rate at which a sound source vibrates or makes the air vibrate.

3. Duration i.e., recurring fluctuation in sound pressure or tone at an interval; sharp or startling noise at recurring interval; the temporal nature (continuous vs. intermittent) of sound.

4. Pure tone which is comprised of a single frequency. Pure tones are relatively rare in nature but, if they do occur, they can be extremely annoying.

Another term, related to the average of the sound energy over time, is the Equivalent Sound Level or $L_{eq.}$ The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent Sound Level is considered to be directly related to the effects of sound on people since it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time. By its derivation L_{eq} does not express the maximum nor minimum SPLs that may occur in a given time period. These maximum and minimum SPLs should be given in the noise analysis. The time interval over which the L_{eq} is measured should always be given. It is generally shown as a parenthetic; $L_{eq\,(8)}$ would indicate that the sound had been measured for a period of eight hours.

Equivalent Sound Level (L_{eq}) correlates well and can be combined with other types of noise analyses such as Composite Noise Rating, Community Noise Equivalent Level and day-night noise levels characterized by L_{dn} where an $L_{eq(24)}$ is measured and 10 dBA is added to all noise levels measured between 10 pm and 7 am. These different types of noise analyses

basically combine noise measurements into measures of cumulative noise exposure and may weight noise occurring at different times by adding decibels to the actual decibel level. Some of these analyses require more complex noise analysis than is mentioned in this guidance. They may be used in a noise analyses prepared for projects.

Designations for sound levels may also be shown as $L_{(10)}$ or $L_{(90)}$ in a noise analysis. These designations refer to the sound pressure level (SPL) that is exceeded for 10% of the time over which the sound is measured, in the case of $L_{(10)}$, and 90% of the time, in the case of $L_{(90)}$. For example, an $L_{(90)}$ of 70 dB(A) means that 70 dB(A) is exceeded for 90% the time for which the measurement was taken.

A. Environmental Setting and Effects on Noise Levels

1. Sound Level Reduction Over Distance - It is important to have an understanding of the way noise decreases with distance. The decrease in sound level from any single noise source normally follows the "inverse square law." That is, SPL changes in inverse proportion to the square of the distance from the sound source. At distances greater than 50 feet from a sound source, every doubling of the distance produces a 6 dB reduction in the sound. Therefore, a sound level of 70 dB at 50 feet would have a sound level of approximately 64 dB at 100 feet. At 200 feet sound from the same source would be perceived at a level of approximately 58 dB.

2. Additive Effects of Multiple Sound Sources - The total sound pressure created by multiple sound sources does not create a mathematical additive effect. Below Table A is given to assist you in calculating combined noise sources. For instance, two proximal noise sources that are 70 dBA each do not have a combined noise level of 140 dBA. In this case the combined noise level is 73 dBA. Since the difference between the two sound levels is 0 dB, Table A tells us to add 3 dB to the sound level to compensate for the additive effects of the sound. To find the cumulative SPL assess the SPLs starting with the two lowest readings and work up to the difference between the two highest readings. For several pieces of equipment, operating at one

time, calculate the difference first between the two lowest SPLs, check Table A and add the appropriate number of decibels to the higher of the two sound levels. Next, take the sound level that was calculated using Table A and subtract the next lowest sound level to be considered for the operation. Consult Table A again for the additive effect and add this to the higher of the two sound levels. Follow this process until all the sound levels are accounted for. As an example, let us say that an area for a new facility is being cleared. The equipment to be used is: two chainsaws, one operating at 57 dBA and one at 60 dBA; a front end loader at 80 dBA; and a truck at 78 dBA. Start with the two lowest sound levels: 60 dBA - 57 dBA = 3 dBA difference. Consulting the chart add 2 dBA to the higher sound level. The cumulative SPL of the two chainsaws is 62 dBA. Next, subtract 62 dBA from 78 dBA. 78 dBA - 62 dBA = 16 dBA. In this case, 0 dBA is added to the higher level so we end up with 78 dBA. Lastly, subtract 78 dBA from the 80 dBA. 80 dBA - 78 dBA = 2 dBA a difference of 2 dBA adds 2 dBA to the higher SPL or 82 dBA. The SPL from these four pieces of equipment operating simultaneously is 82 dBA.

Table A

Approximate Addition of Sound Levels

Difference Between Two Sound Levels	Add to the Higher of the Two Sound Levels
1 dB or less	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0 dB

(USEPA, Protective Noise Levels, 1978)

3. Temperature and Humidity - Sound energy is absorbed in the air as a function of temperature, humidity and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. Such attenuation is short term and, since it occurs over a great distance, should not be considered in calculations. Higher temperatures tend to increase sound velocity but does

not have an effect on the SPL. Sound waves bend towards cooler temperatures. Temperature inversions may cause temporary problems when cooler air is next to the earth allowing for more distant propagation of sound. Similarly, sound waves will bend towards water when it is cooler than the air and bounce along the highly reflective surface. Consequently large water bodies between the sound source and the receptor may affect noise attenuation over distance.

4. Time of Year - Summer time noises have the greatest potential for causing annoyance because of open windows, outside activities, etc. During the winter people tend to spend more time indoors and have the windows closed. In general, building walls and windows that are closed provide a 15 dB reduction in noise levels. Building walls with the windows open allow for only a 5 dB reduction in SPL.

5. Wind - Wind can further reduce the sound heard at a distance if the receptor is upwind of the sound. The action of the wind disperses the sound waves reducing the SPLs upwind. While it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experienced at the same distance without a wind. This dispels the common belief that sound levels are increased downwind due to wind carrying noise.

6. Land forms and structures - In certain circumstances, sound levels can be accentuated or focused by certain features to cause adverse noise impacts at specified locations. At a hard rock mine, curved quarry walls may have the potential to cause an amphitheater effect while straight cliffs and quarry walls may cause an echo. Buildings that line streets in cities can cause a canyon effect where sound can be reflected from the building surfaces similar to what might happen in a canyon. Consideration of noise impacts associated with these types of conditions may require specialized expertise to evaluate impact potential and to formulate suitable mitigation techniques.

Consideration of existing noise sources and sound receptors in proximity to a proposed activity can be important considerations even when the activity under review is not a noise source. Topography, vegetation, structures and the relative location of noise receptors and sources to these features are all aspects of the environmental setting that can influence noise impact potential. As such, land alteration may also indirectly create an adverse noise impact where natural land features or manmade features serve as a noise barrier or provide noise attenuation for existing sources of noise, i.e. highway, railroads, manufacturing activity. Removal of these features, i.e. hills, vegetation, large structures or walls, can expose receptors to increased sound pressure levels causing noise problems where none had previously existed.

B. Impact Assessment

1. Factors to Consider

Factors to consider in determining the impact of noise on humans, are as follows:

a. Evaluation of Sound Characteristics

(1) Ambient noise level - A noise can only intrude if it differs in character or SPL from the normal ambient sound. Most objective attempts to assess nuisance noise adopt the technique of comparing the noise with actual ambient sound levels or with some derived criterion.

(2) Future noise level - The ambient noise level plus the noise level from the new or proposed source.

(3) Increase In Sound Pressure Level - A significant factor in determining the annoyance of a noise is Sound Pressure Level (SPL). SPLs are measured in decibels.

(4) Sharp and Startling Noise - These high frequency and high intensity noises can be extremely annoying. When initially evaluating the effects

of noise from an operation, pay particular attention to noises that can be particularly annoying. One such noise is the back-up beepers required to be used on machinery. They definitely catch one's attention as they were meant to do. Continual beeping by machinery can be mitigated (see Section V.C. Mitigation - Best Management Practices). Another impulse noise source that can be very annoying is the exhaust from compressed air machinery. This exhaust is usually released in loud bursts. Compressed air exhaust can also be mitigated if it causes a noise problem by using readily available mufflers or specifically designed enclosures.

(5) Frequency and Tone - Frequency is the rate at which a sound source vibrates or makes the air vibrate. Frequency is measured in Hertz (Hz). Frequency can also be classified as high ("sharp"), low ("dull"), and moderate. Pure tones are rare in nature. Tonal sounds usually consist of pure tones at several frequencies. Pure tones and tonal sounds are discerned more readily by the human ear. Pure tones and tonal sounds are compensated for in sound studies by adding a calculated number of dB(A) to the measured sound pressure.

(6) Percentile of Sound Levels - Fluctuations of SPLs can be expressed as a percentile level designated as $L_{(n)}$ where a given decibel level is exceeded *n* % of the time. A designation of $L_{(10)}$ = 70 dBA means the measured SPLs exceeded 70 dBA 10% of the time. A designation of $L_{(90)}$ = 70 dBA means the measured SPLs were exceeded 90% of the time. $L_{(90)}$ is often used to designate the background noise level.

(7) Expression of Overall Sound - Part of the overall assessment of sound is the *Equivalent Sound Level* (L_{eq}) which assigns a single value of sound level for a period of time in which varying levels of sound are experienced over that time period. The L_{eq} value provides an indication of the effects of sound on people. It is also useful in establishing the ambient sound levels at a potential noise source.

In order to evaluate the above factors in the appropriate context, one must identify the following: 1) appropriate receptor locations for sound level calculation or measurement; 2) ambient sound levels and characteristics at these receptor locations; and 3) the sound pressure increase and characteristics of the sound that represents a significant noise effect at a receptor location.

b. Receptor Locations

Appropriate receptor locations may be either at the property line of the parcel on which the facility is located or at the location of use or inhabitance on adjacent property. The solid waste regulations require the measurements of sound levels be at the property line. The most conservative approach utilizes the property line. The property line should be the point of reference when adjacent land use is proximal to the property line. Reference points at other locations on adjacent properties can be chosen after determining that existing property usage between the property line and the reference point would not be impaired by noise, i.e., property uses are relatively remote from the property line. The location of the facility should be shown on a map in relation to each potential receptor. Any future expansion should be described in a narrative as well as depicted on a map. The map and narrative should also include the distance of the operation to each point of reception including the distance at the point in time when an expanding operation will be closest to the receptors.

c. Thresholds for Significant Sound Pressure Level (SPL) Increase

The goal for any permitted operation should be to minimize increases in sound pressure level above ambient levels at the chosen point of sound reception. Increases ranging from 0-3 dB should have no appreciable effect on receptors. Increases from 3-6 dB may have potential for adverse noise impact only in cases where the most sensitive of receptors are present. Sound pressure increases of more than 6 dB may require a closer analysis of impact potential depending on

existing SPLs and the character of surrounding land use and receptors. SPL increases approaching 10 dB result in a perceived doubling of SPL. The perceived doubling of the SPL results from the fact that SPLs are measured on a logarithmic scale. An increase of 10 dB(A) deserves consideration of avoidance and mitigation measures in most cases. The above thresholds as indicators of impact potential should be viewed as guidelines subject to adjustment as appropriate for the specific circumstances one encounters.

Establishing a maximum SPL at the point of reception can be an appropriate approach to addressing potential adverse noise impacts. Noise thresholds are established for solid waste management facilities in the Department's Solid Waste regulations, 6 NYCRR Part 360. Most humans find a sound level of 60 - 70 dB(A) as beginning to create a condition of significant noise effect (EPA 550/9-79-100, November 1978). In general, the EPA's "Protective Noise Levels" guidance found that ambient noise levels # 55 dBA $L_{(dn)}$ was sufficient to protect public health and welfare and, in most cases, did not create an annoyance (EPA 550/9-79-100, November 1978). In non-industrial settings the SPL should probably not exceed ambient noise by more than 6 dB(A) at the receptor. An increase of 6 dB(A) may cause complaints. There may be occasions where an increase in SPLs of greater than 6 dB(A) might be acceptable. The addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dB(A). This would be considered the "upper end" limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet. Some outdoor activities can be conducted at a SPL of 65 dB(A). Still lower ambient noise levels may be necessary if there are sensitive receptors nearby. These goals can be attained by using the mitigative techniques outlined in this guidance.

Ambient noise SPLs in industrial or commercial areas may exceed 65 dB(A) with a high end of approximately 79 dB(A) (EPA 550/9-79-100, November 1979). In these instances mitigative measures utilizing best management practices should be used in an effort to ensure that a facility's generated sound levels are at a minimum. The goal in an industrial/commercial area, where ambient SPLs are already at a high level, should be not to exceed the ambient SPL. Remember, if a new source

operates at the same noise level as the ambient, then 3 dB(A) must be added to the existing ambient noise level to obtain the future noise level. If the goal is not to raise the future noise levels the new facility would have to operate at 10 dB(A) or more lower than the ambient.(see Table A)

Table B

HUMAN REACTION TO INCREASES IN SOUND PRESSURE LEVEL

Increase in Sound Pressure (dB)	Human Reaction
Under 5	Unnoticed to tolerable
5 - 10	Intrusive
10 - 15	Very noticeable
15 - 20	Objectionable
Over 20	Very objectionable to intolerable

(Down and Stocks - 1978)

Impact assessment will vary for specific project reviews, but must consist of certain basic components for all assessments. Additional examination of sound generation and noise reception are necessary, where circumstances warrant. Sound impact evaluation is an incremental process, with four potential outcomes:

- exemption criteria are met and no noise evaluation is required;
- noise impacts are determined to be non-significant (after first-level evaluation);
- noise impacts are identified as a potential issue but can be readily mitigated (after second level evaluation); or
- noise impacts are identified as a significant issue requiring analysis of alternatives as well as mitigation (third level evaluation).

All levels of evaluation may require preparation of a noise analysis. The required scope of noise impact analysis can be rudimentary to rather sophisticated, depending on circumstances and the results obtained from initial levels of evaluation. Recommendations for each level of evaluation are presented below.

2. Situations in Which No Noise Evaluation is Necessary

When certain criteria are satisfied, the need for undertaking a noise impact analysis at any level is eliminated. These criteria are as follows:

a. The site is contained within an area in which local zoning provides for the intended use as a "right of use". It does not apply to activities that are permissible only after an applicant is granted a special use permit by the local government; and

b. The applicant's operational plan incorporates appropriate best management practices (BMPs [see Section V.C. Mitigation - Best Management Practices]) for noise control for all facets of the operation.

Where activities may be undertaken as a "right of use", it is presumed that noise has been addressed in establishing the zoning. Any residual noise that is present following BMP implementation should be considered an inherent component of the activity that has been found acceptable in consideration of the zoning designation of the site.

3. First Level Noise Impact Evaluation

The initial evaluation for most facilities should determine the maximum amount of sound created at a single point in time by multiple activities for the proposed project. All facets of the construction and operation that produce noise should be included such as land clearing activities (chain saw and equipment operation), drilling, equipment operation for excavating, hauling or conveying materials, pile driving, steel work, material processing, product storage and removal. Land clearing and construction may be only temporary noise at the site whereas the ongoing operation of a facility would be considered permanent noise. An analysis may be required for

various phases of the construction and operation of the project to assure that adverse noise effects do not occur at any phase.

To calculate the sound generated by equipment operation, one can consult the manufacturers' specifications for sound generation, available for various types of equipment. Another option for calculating the sound to be generated by equipment is to make actual measurements of sound generated by existing similar equipment, elsewhere.

Tables C and D summarize noise measurements from some common equipment used in construction and mining. Table E summarizes the noise level, in decibels (dB[A]), from some common sources. This information can be used to assist Department staff in relating potential noise impacts to sound levels produced by commercial and industrial activities. Use of these tables in the first level of analysis will help determine whether or not noise will be an issue and whether actual measurements should be made to confirm noise levels.

Table C

PROJECTED NOISE LEVELS

Noise Source	Measurements	1,000 feet	2,000 feet	3,000 feet
Primary and secondary crusher	89 dB(A) at 100 ft	69.0 dB(A)	63.0 dB(A)	59.5 dB(A)
Hitachi 501 shovel loading	92 dB(A) at 50 ft	66.0 dB(A)	60.0 dB(A)	56.5 dB(A)
Euclid R-50 pit truck loaded	90 dB(A) at 50 ft	64.0 dB(A)	58.0 dB(A)	54.4 dB(A)
Caterpillar 988 loader	80 dB(A) at 300 ft	69.5 dB(A)	63.5 dB(A)	60.0 dB(A)

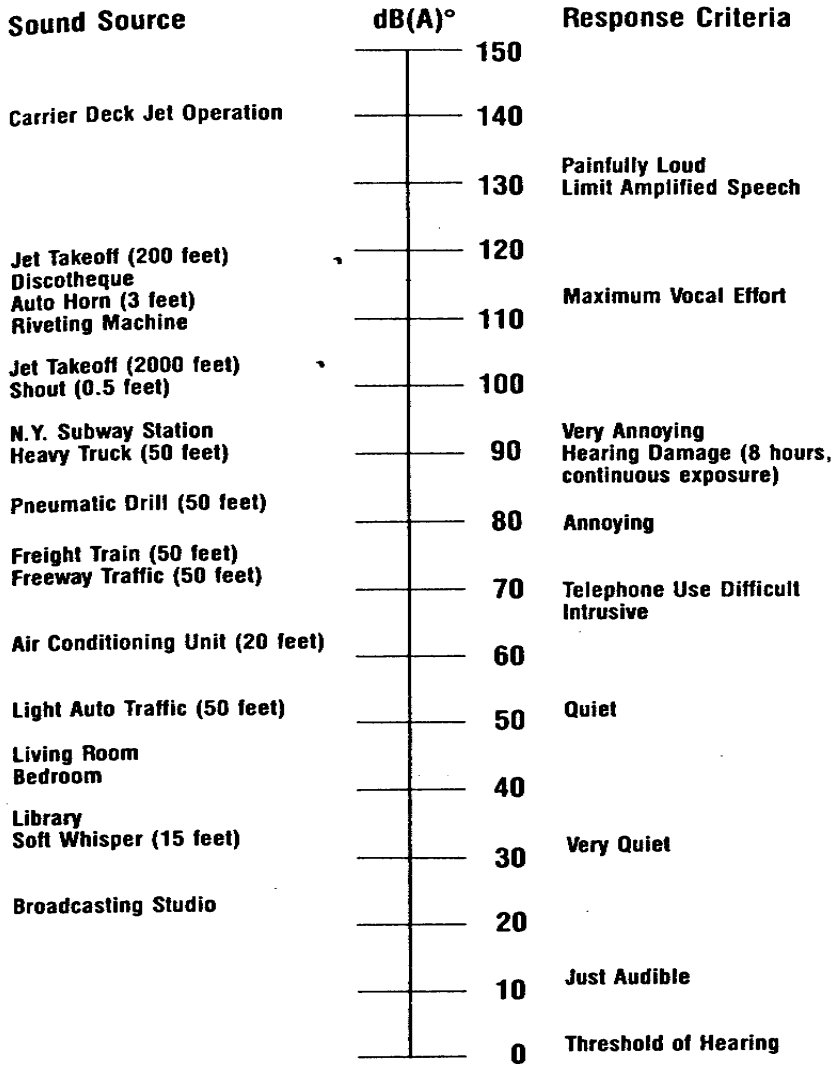
(The Aggregate Handbook, 1991)

Table D
Common Equipment Sound Levels

EQUIPMENT	**DECIBEL LEVEL**	**DISTANCE** in feet
Augered earth drill	80	50
Backhoe	83-86	50
Cement mixer	63-71	50
Chain saw cutting trees	75-81	50
Compressor	67	50
Garbage Truck	71-83	50
Jackhammer	82	50
Paving breaker	82	50
Wood Chipper	89	50
Bulldozer	80	50
Grader	85	50
Truck	91	50
Generator	78	50
Rock drill	98	50

(excerpt and derived from Cowan, 1994)

Table E



(The Aggregate Handbook, 1991)

The sound level at receptor locations should be calculated using the inverse square rule whereby sound is attenuated over distance. Again, each doubling of the distance from the source of a noise decreases the SPL by 6 dB(A) at distances greater than 50 feet. This calculation should first consider the straight line distance between the point of noise generation and the point of noise reception with the presumption that no natural or manmade features exist along the transect between the two points that would further attenuate sound level. Calculations should be performed for each point of reception in all directions being careful to evaluate the worst case noise impact potential by considering activities at the point where they would be closest to a receptor. The sound level calculated for the point of reception should be related to ambient sound levels. Ambient sound levels can be either measured or assumed based on established references for the environmental setting and land use at the point of reception. For estimation purposes, ambient SPLs will vary from approximately 35 dB(A) in a wilderness area to approximately 87 dB(A) in a highly industrial setting. A quiet seemingly serene setting such as rural farm land will be at the lower end of the scale at about 45 dB(A), whereas an urban industrial area will be at the high end of this scale at around 79 dB(A) (EPA 550/9-79-100, November 1978). If there is any concern that levels based on reference values do not accurately reflect ambient SPL, field measurements should be undertaken to determine ambient SPLs.

Where this evaluation indicates that sound levels at the point of reception will not be perceptible, similar to or only slightly elevated as compared to ambient conditions, no further evaluation is required. When there is an indication from this initial analysis that marginal or significant noise impact may occur, further evaluation is required. In determining the potential for an adverse noise impact, consider not only ambient noise levels, but also the existing land use, and whether or not an increased noise level or the introduction of a discernable sound, that is out of character with existing sounds, will be considered annoying or obtrusive. (see B.1.a Evaluation of Sound Characteristics)

4. Second Level Noise Impact Evaluation

Further refine the evaluation of noise impact potential by factoring in any additional noise attenuation that will be provided by existing natural topography, fabricated structures such as buildings, walls or berms or vegetation located between the point of noise generation and noise reception. This analysis may require consideration of future conditions and the loss of natural noise buffers over time.

Dense vegetation that is at least 100 feet in depth will reduce the sound levels by 3 to 7 dB(A). Evergreens provide a better vegetative screen than deciduous trees. Keep in mind that if a vegetative screen does not currently exist, planting a vegetative screen may require 15 or more years of growth before it becomes effective.

The degree to which topography attenuates noise depends on how close the feature is located to the source or the receptor of the noise. Topography can act as a natural screen. The closer a hill or other barrier is to the noise source or the receptor, the larger the sound shadow will be on the side opposite the noise source. Certain operations such as mining and landfills may be able to use topography to maintain a screen between the operation and receptors as they progress. Mining operations may be able to create screens by opening a mine in the center of the site using and maintaining the pit walls as barriers against sound (Aggregate Handbook, 1991).

If after taking into account all the attenuating features the potential still exists for adverse noise impact, other types of noise analyses or modeling should be used to characterize the source. An Equivalent Sound Level (L_{eq}) analysis or a related type of noise analysis may better define activities or sources that require more mitigation or isolation so that noise emanating from these sources will not cause an adverse impact.

Where it is demonstrated that noise absorbing or deflecting features further attenuate sound reception to a level of no significant increase, no further analysis is necessary. Where it is determined that noise level or the character of the noise may

have a significant adverse effect on receptors, other noise mitigation measures should be evaluated in an expanded noise analysis.

5. Third Level - Mitigation Measures

When the above analyses indicate significant noise effects may or will occur, the applicant should evaluate options for implementation of mitigation measures that avoid, or diminish significant noise effects to acceptable levels (see Section V.C. Mitigation - Best Management Practices). Adequate details concerning mitigation measures and an evaluation of the effectiveness of the mitigative measures through additional sound level calculations should be provided in a noise analysis. These calculations are to factor in the noise reduction or avoidance capabilities of the mitigation measures. In circumstances where noise effects cannot readily be reduced to a level of no significance by project design or operational features in the application, the applicant must evaluate alternatives and mitigation measures in an environmental impact statement to avoid or reduce impacts to the maximum extent practicable per the requirements of the State Environmental Quality Review Act (SEQR).

The noise analysis should be part of the application or a supplement to it, and will be part of the SEQR environmental assessment by reference. Duplicative noise analysis information is not required for the permit application and the assessment of impacts under SEQR. A proper analysis can satisfy information needs for both purposes.

C. Mitigation - Best Management Practices (BMP) for Reducing Noise

Various noise abatement techniques are available for reducing frequency of sound, duration of sound or SPLs at receptor locations. The mitigation techniques given below are listed according to what sound characteristic they mitigate.

1. Reduce noise frequency and impulse noise at the source of generation by:

   a. Replacing back-up beepers on machinery with strobe lights (subject to other requirements, e.g., OSHA and Mine Safety and Health Administration, as applicable). This eliminates the most annoying impulse beeping;

   b. Using appropriate mufflers to reduce the frequency of sound on machinery that pulses, such as diesel engines and compressed air machinery;

   c. Changing equipment: using electric motors instead of compressed air driven machinery; using low speed fans in place of high speed fans;

   d. Modifying machinery to reduce noise by using plastic liners, flexible noise control covers, and dampening plates and pads on large sheet metal surfaces; and

2. Reduce noise duration by:

   a. Limiting the number of days of operation, restricting the hours of operation and specifying the time of day and hours of access and egress can abate noise impacts.

   b. Limiting noisier operations to normal work day hours may reduce or eliminate complaints.

Limiting hours of construction or operation can be an effective tool in reducing potential adverse impacts of noise. The impacts of noise on receptors can be

significantly reduced by effectively managing the hours at which the loudest of the operations can take place.

Implementation of hours of operation does not reduce the SPL emanating from a facility. Determining whether or not hours of operation will be effective, mitigation requires consideration of: public safety, for example road construction at night may reduce traffic concerns and facilitate work; duration of the activity, is it a one time event necessary to meet a short term goal or will the activity become an ongoing operation; and surrounding land use, consider what type(s) of land use is proximal to the activity and at what time(s) might a reduction of noise levels be necessary. There may be other factors to consider due to the uniqueness of a given activity or the type of land use adjacent to the activity. Hours of operation should also consider weekend activities and legal holidays that may change the types of land use adjacent to the permitted activity or increase traffic levels in an area.

The best results from using hours of operation as a mitigative measure will be obtained if the hours are negotiated with the owner or operator of the facility. The less noisy aspects of an operation may not have to be subject to the requirements of hours of operation such as preparing, greasing and maintaining machinery for the upcoming day's operation. The more noisy operations can be scheduled to begin when people in the receptor area are less likely to be adversely effected. Hours of operation should be included in the operation plans for a facility that becomes part of the permit, or in the event that there is no operation plan, can be included as a permit condition.

3. Reduce Noise sound pressure levels by:

   a. Increasing the setback distance.
   b. Moving processing equipment during operation further from receptors.
   c. Substituting quieter equipment (example - replacing compressed air fan with an electric fan could result in a 20 dB reduction of noise level).

d. Using mufflers selected to match the type of equipment and air or gas flow on mechanical equipment.
e. Ensuring that equipment is regularly maintained.
f. Enclosing processing equipment in buildings (example - enclosing noisy equipment could result in an 8-10 dB noise level reduction, a 9 inch brick wall can reduce SPL by 45-50 dB).
g. Erecting sound barriers such as screens or berms around the noise generating equipment or near the point of reception. The angle of deflection also increases as the height of a screen or barrier increases. Screens or barriers should be located as close to the noise source or the receptor as possible. The closer the barrier is located to the source or the receptor, the greater the angle of deflection of the sound waves will be creating a larger "sound shadow" on the side opposite the barrier. Stockpiles of raw material or finished product can be an effective sound barrier if strategically placed.
h. phasing operations to preserve natural barriers as long as possible.
i. altering the direction, size, proximity of expanding operations.
j. Designing enclosed facilities to prevent or minimize an SPL increases above ambient levels. This would require a noise analysis and building designed by a qualified engineer that includes adequate ventilation with noise abatement systems on the ventilation system.

Public notification of upcoming loud events can also be used as a form of mitigation although it doesn't fit easily into the categories above. People are less likely to get upset if they know of an upcoming event and know that it will be temporary.

The applicant should demonstrate that the specific mitigation measures proposed will be effective in preventing adverse noise effects on receptors.

D. Decision Making - Conditioning Permits to Limit Noise Impacts

Preferably, the mitigation measures as outlined in the construction and operational plans should be relied upon to mitigate the effects of noise on receptors. The permit should state that the activity will be conducted in accordance with the approved plan. Otherwise, mitigation measures and BMP's can be imposed within specific permit conditions.

It is not the intention of this guidance to require decibel limits to be established for operations where such limits are not required by regulation. There are, however, instances when a decibel limit may be established for an operation to ensure activities do not create unacceptable noise effects, as follows:

1. The review of a draft and final environmental impact statement demonstrates the need for imposition of a decibel limit;
2. A decibel limit is established by the Commissioner's findings after a public hearing has been held on an application;
3. The applicant asks to have a decibel limit to demonstrate the ability to comply; or
4. A program division seeks to establish a decibel limit as a permit condition, when necessary to demonstrate avoidance of unacceptable noise impact.

Ultimately, the final decision must incorporate appropriate measures to minimize or avoid significant noise impacts, as required under SEQR. Any unavoidable adverse effects must be weighed along with other social and economic considerations in deciding whether to approve or deny a permit.

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APPENDIX B -
INSTRUMENT CALIBRATION SHEETS

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 5392
Description Quest QC-10 Acoustic Calibrator
Calibrated 5/26/2022

Manufacturer Quest
Model Number QC-10
Serial Number QID050172
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 35

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

Test Instrument ID	Description	Manufacturer	Serial Number	(As Of Cal Entry Date) Last Cal Date	Next Cal Date
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

CASELLA

Certificate of Conformity and Calibration FA05190

Instrument Type:-	**CEL-633C**
Serial Number	4210504
Firmware revision	V006-05
Microphone Type:-	**CEL-251**
Serial Number	05084
Preamplifier Type:-	**CEL-495**
Serial Number	005056
Instrument Class/Type:-	1



Applicable standards:-

IEC 61672: 2002 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- *The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C	**Test Engineer:-**	Nicola Cartwright
	32 %RH	**Date of Issue:-**	July 4, 2022
	1014 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2008 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

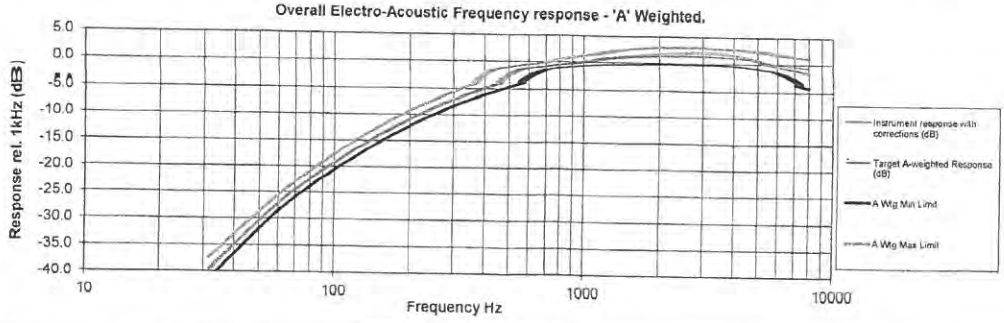
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - *A Weighted*

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Email: info@casellasolutions.cn

INSTRUMENT CALIBRATION REPORT

Advanced Labs, Inc.

Pine Environmental Services, Inc

Instrument ID 17320
Description Quest SoundPro DL-2-1/3
Calibrated 5/27/2022

Manufacturer Quest
Model Number SoundPro DL-2-1/3
Serial Number BIJ090026
Location New Jersey
Temp 70

Classification
Status pass
Frequency Yearly
Department Lab
Humidity 40

Calibration Specifications

Group # 1
Group Name Acoustic Tests Performed
Test Performed: Yes **As Found Result: Pass** **As Left Result: Pass**

Test Instruments Used During the Calibration

				(As Of Cal Entry Date)	
Test Instrument ID	**Description**	**Manufacturer**	**Serial Number**	**Last Cal Date**	**Next Cal Date**
B&K 4226	Brüel & Kjær 4226	Brüel & Kjær	2590968	7/27/2021	7/27/2022
B&K 4228	Brüel & Kjær 4228	Brüel & Kjær	2667476	7/27/2021	7/27/2022

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated David Galego

Advanced Labs, Inc. hereby certifies that this instrument is calibrated and functions to meet the manufacture's specifications using NIST traceable standards, or is derived from accepted values of physical constants.

Certificate of Conformity and Calibration



Instrument Model:-	CEL-633C		
Serial Number	0442231		
Firmware revision	V129-09		
Microphone Type:-	CEL-252	Preamplifier Type:-	CEL-495
Serial Number	89713	Serial Number	001775
Instrument Class/Type:-	2		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	22 °C 25 %RH 1015 mBar	Test Engineer:- Date of Issue:-	Paul Blackwell December 22, 2021

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

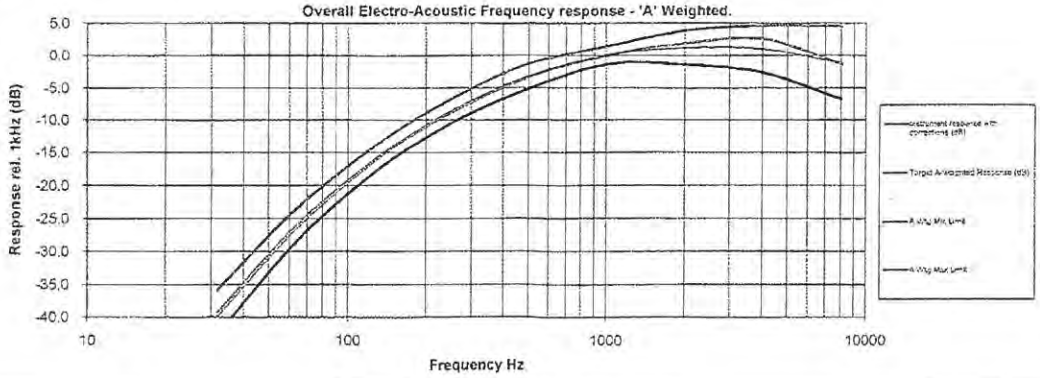
Test Summary:-

Self Generated Noise Test	All Tests Pass
Electrical Signal Test Of Frequency Weightings	All Tests Pass
Frequency & Time Weightings At 1 kHz	All Tests Pass
Level Linearity On The Reference Level Range	All Tests Pass
Toneburst Response Test	All Tests Pass
C-peak Sound Levels	All Tests Pass
Overload Indication	All Tests Pass
Acoustic Tests	All Tests Pass

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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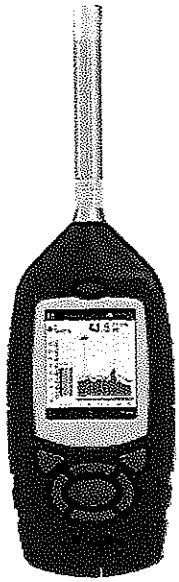
Email: info@casellasolutions.cn

1010

Certificate of Conformity and Calibration



Instrument Model:-	**CEL-633C**		
Serial Number	4637949		
Firmware revision	V129-09		
Microphone Type:-	**CEL-252**	**Preamplifier Type:-**	**CEL-495**
Serial Number	60590	Serial Number	002125
Instrument Class/Type:-	**2**		

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-	23 °C	**Test Engineer:-**	Paul Blackwell
	33 %RH	**Date of Issue:-**	December 14, 2021
	1021 mBar		

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

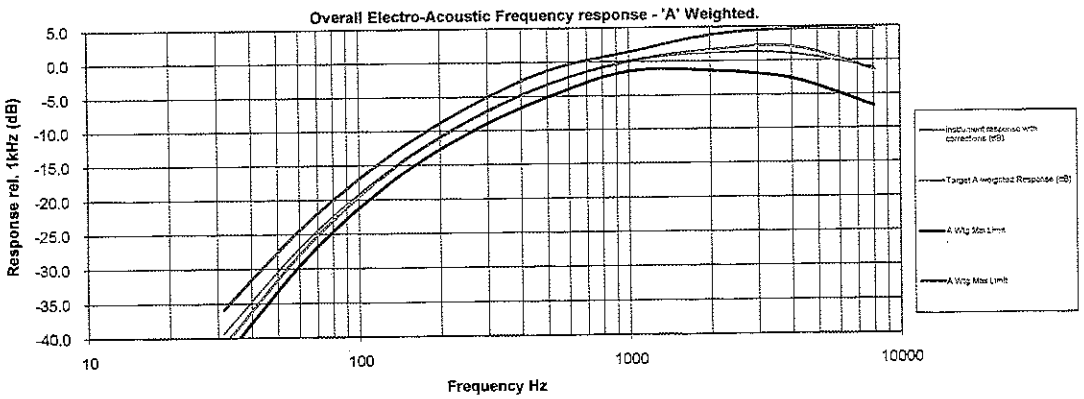
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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Email: info@casellasolutions.cn

1011

Certificate of Conformity and Calibration



Instrument Model:- CEL-633C

Serial Number 2145334
Firmware revision V129-09

Microphone Type:- CEL-251
Serial Number 5766

Preamplifier Type:- CEL-495
Serial Number 004239

Instrument Class/Type:- 1

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- The test sequences performed in this report are in accordance with the current Sound level meter *Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:-

23 °C
29 %RH
999 mBar

Test Engineer:- Paul Blackwell
Date of Issue:- April 12, 2022

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

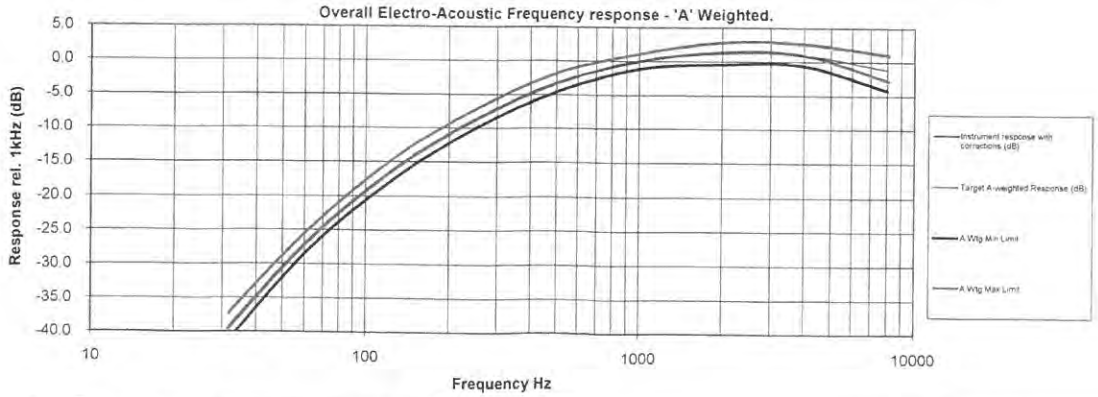
Test Summary:-

Self Generated Noise Test	**All Tests Pass**
Electrical Signal Test Of Frequency Weightings	**All Tests Pass**
Frequency & Time Weightings At 1 kHz	**All Tests Pass**
Level Linearity On The Reference Level Range	**All Tests Pass**
Toneburst Response Test	**All Tests Pass**
C-peak Sound Levels	**All Tests Pass**
Overload Indication	**All Tests Pass**
Acoustic Tests	**All Tests Pass**

Combined Electro-Acoustic Frequency Response - A Weighted

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.



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CASELLA

Certificate of Conformity and Calibration

Customer:	Eco-Rental Solutions
Instrument:	CEL-120/1
Serial Number:	5230919
Job Number:	25508
Date of Issue:	12-Apr-2022
Engineer:	P Blackwell

Traceable Equipment:		
	Reference Calibrator	EQ11085
	DVM type Fluke 45	EQ00318

Test Conditions:

Ambient Temperature	23.0	°C
Ambient Humidity	29.0	%RH
Ambient Pressure	999	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.04 dB	N/A dB	1.0000 kHz
Final Reading	114.00 dB	N/A dB	1.0000 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9000:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

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APPENDIX C -
PHOTO LOG

1014

Photo 1: M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad.



Photo 2: M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad.



Photo 3: M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad.



Photo 4: M-4 – Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad.



Photo 5: M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad.

APPENDIX D -
MODEL DATA

1020

SOUND SOURCE

SOURCE	SOUND POWER LEVEL dB	SOUND POWER LEVEL dB(A)	HEIGHT ABOVE GROUND (m)
M109A3GN (155 mm) Howitzer	180.8	163.2	2
40 Ton Haul Truck	117.6	115.7	2

MODEL CONFIGURATION

MODEL PARAMETER	SETTINGS
Atmospheric Absorption	20°C / 70% Humidity
Ground Absorption	0.7G Ground Factor
Receiver Height	1.5 meters for sound level isolines and receivers
Model Radius	3,218 m

MODELED SOUND LEVEL AT RECEIVERS

M 109 No Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	75	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	107	1.5

M 109 with Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	67	1.5
M-2	71	1.5
M-3	73	1.5
M-4	79	1.5
M-5	100	1.5

40-Ton Haul Truck No Berm

RECEIVER	Molded Impulse Sound Level dB(A)	HEIGHT ABOVE GROUND (m)
M-1	44	1.5
M-2	20	1.5
M-3	33	1.5
M-4	33	1.5
M-5	60	1.5

1021

APPENDIX E –
2022 BALLISTICS TEST RANGE SOUND ANALYSES SCOPE OF WORK

H2H GEOSCIENCE ENGINEERING

179 River Street, Troy, New York 12180

Environmental Professionals
Geologic Consultants
Construction Services

(518) 270-1620/Fax (518) 270-1672

November 9, 2022

Fritz Aldinger
APA Environmental Program Specialist 1

Re: 2022 Ballistics Test Range Sound Analyses
Lewis, NY
APA Project No. 2021-0276

Dear Fritz:

H2H Geoscience and Engineering, PLLC is pleased to submit the following Scope of Work to perform a sound analysis at the above reference site.

Project Understanding

Unconventional Concepts, Inc. (UCI) intends to construct a ballistics test rang for use in supporting research and development operations of various kinetic systems used by the United States. A record of UCI's submission to the Adirondack Park Agency (APA) was provided to H2H Geoscience Engineering, PLLC (H2H) for review; based on our review of the provided reports, H2H has developed the following Scope of Work (SOW).

Scope of Work

H2H intends to collect ambient (no unapproved UCI operations taking place) sound levels, as well has additional sound level modeling to support a revised sound study, to address the APA's June 6, 2022 - Third Notice of Incomplete Permit Application.

Task 1: Sound Level Monitoring

H2H has developed a Site Overview Map (Figure 1) showing all identified receptors within a two-mile radius (Project Area) of the ballistics testing Firing Pad. The Firing Pad (100 ft. by 100 ft.) is in the northeast corner of parcel 38.1-1-31.000 (UCI Site). The Control Operations Area is located adjacent to the Firing Pad; the Target Area is located 590 ft. west of the Firing Pad (Figure 2).

Forty-two Residential Receptors (occupied residential structure) were identified with the two-mile radius. Four parcels of State Land classified as Wild Forest fall within the two-mile radius; no parcels of State Land classified as Wilderness are within the two-mile radius.

Based on the locations of identified receptors H2H selected five sound level monitoring locations surrounding the Firing Pad to best determine ambient sound level conditions in the Project Area. H2H will conduct sound level monitoring at each of the identified five-monitoring location (Figure 1) to identify, and note major sources of sound contributing to ambient conditions. Collected sound levels will be A-weighted, logged at 1-second intervals. Monitoring will take place during the anticipated hours of operation (10:00 AM – 4:00 PM) over the course of two weekdays. Monitoring will be conducted during fair weather conditions. The collected sound levels will serve as ambient sound levels for the area surrounding each monitoring location.

The following is a description of each sound monitoring location:

M-1 – Monitoring location M-1 is located adjacent to Residential Receptor R-2 located on Hale Hill Road at elevation 795 ft. amsl. 4,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for R-2 (closest Residential Receptor), and the surrounding area of Hale Hill Road.

M-2 – Monitoring Location M-2 is located south of the Firing Pad adjacent to Residential Receptor R-42 on Pulsifer Road at elevation 715 ft. amsl., 9,500 ft. from the Firing Pad. This monitoring location will provide ambient sound levels for the area surround Pulsifer Rd.

M-3 – Monitoring Location M-3 is located southeast of the Firing Pad along Route 9 at elevation 660 ft. amsl., 7,700 ft. from the firing pad. This monitoring location will provide ambient sound levels for the area along State Route 9 and adjacent commercial area.

M-4 - Monitoring Location M-4 is located southwest of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,500 ft. amsl., 5,200 ft. from the firing pad. This monitoring location will provide ambient sound levels for land classified as Wild Forest to the southwest

M-5 – Monitoring Location M-5 is located northeast of the Firing Pad adjacent to State Lands classified as Wild Forest at elevation 1,380 ft. amsl., 510 ft. from the firing pad. This monitoring location will provide ambient sound levels of land classified as Wild Forest to the northeast.

Task 2: Sound Level Modeling

Based on source sound level data (loudest kinetic systems to be tested) provided by UCI, H2H will model the anticipated sound level at identified receptors under fair weather conditions, and worst case (overcast with wind toward receptor) weather conditions. H2H will follow NYSDEC Guidance documents for evaluating the modeled sound level at receptors vs. the measured ambient sound level at each receptor.

If you have any questions regarding this information, please contact me at 518.270.1620 ext. 102, or by email mpolacco@h2hg-e.com.

Sincerely,

H2H Geoscience Engineering, PLLC

Michael Polacco

Michael Polacco
Project Geologist

c. Richard A. Hisert, PhD PG – H2H
Lori Settle – Unconventional Concepts, Inc.

FIGURES

1025

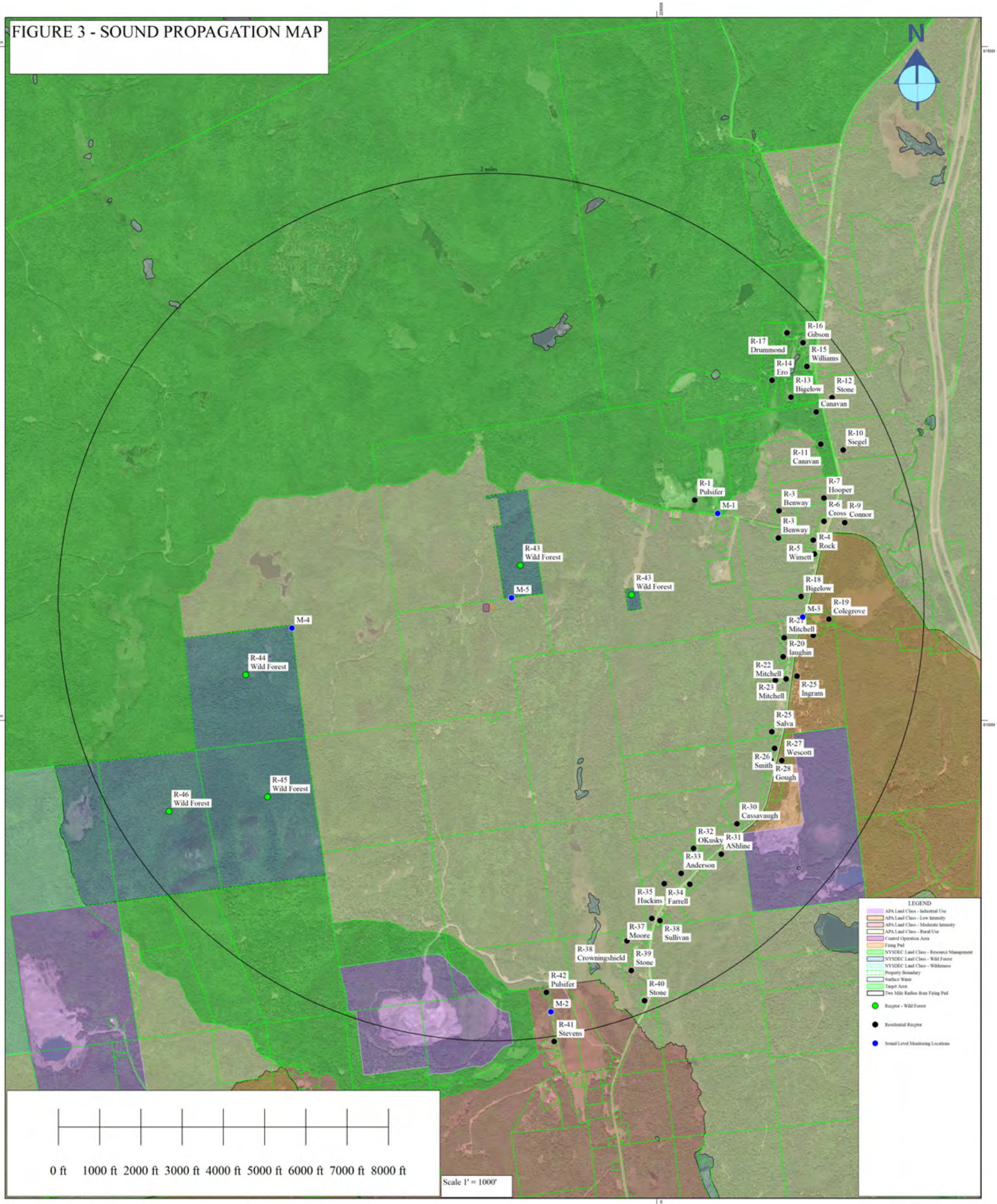
FIGURE 3 - SOUND PROPAGATION MAP
N
2 miles
R-16 Gibson
R-17 Drummond
R-15 Williams
R-14 Ero
R-13 Bigelow
R-12 Stone
Canavan
R-10 Siegel
R-11 Canavan
R-1 Pulsifer
M-1
R-7 Hooper
R-3 Benway
R-6 Cross
R-9 Connor
R-3 Benway
R-4 Rock
R-5 Wimett
R-43 Wild Forest
M-5
R-43 Wild Forest
R-18 Bigelow
M-3
R-19 Colegrove
M-4
R-21 Mitchell
R-20 laughin
R-44 Wild Forest
R-22 Mitchell
R-25 Ingram
R-23 Mitchell
R-25 Salva
R-27 Wescott
R-26 Smith
R-28 Gough
R-45 Wild Forest
R-46 Wild Forest
R-30 Cassavaugh
R-32 OKusky
R-31 AShline
R-33 Anderson
R-35 Huckins
R-34 Farrell
R-37 Moore
R-38 Sullivan
R-38 Crowningshield
R-39 Stone
R-42 Pulsifer
R-40 Stone
M-2
R-41 Stevens
LEGEND
APA Land Class - Industrial Use
APA Land Class - Low Intensity
APA Land Class - Moderate Intensity
APA Land Class - Rural Use
Control Operation Area
Firing Pad
NYSDEC Land Class - Resource Management
NYSDEC Land Class - Wild Forest
NYSDEC Land Class - Wilderness
Property Boundary
Surface Water
Target Area
Two Mile Radius from Firing Pad
Receptor - Wild Forest
Residential Receptor
Sound Level Monitoring Locations
0 ft 1000 ft 2000 ft 3000 ft 4000 ft 5000 ft 6000 ft 7000 ft 8000 ft
Scale 1" = 1000'

1026

FIGURE - 2 SITE MAP



1027

APPENDIX F –
INPUT DATA and RESULTS of SOUND PROPGATION MODELS

1028

Noise Mapping Results 40 ton haul truck / No Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
M-1	1.5	44.39		21.03	19.76	23.27	35.13	42.26	38.29	23.78	-20.33
M-2	1.5	20.1		6.99	7.74	10.78	16.84	14.8	-0.03	-49.88	-225.27
M-3	1.5	32.75		14.6	12.56	16.68	26.08	30.73	23.04	-3.93	-95.95
M-4	1.5	32.8		12.96	14.15	18.5	27.88	29.95	22.73	-2.68	-87.75
M-5	1.5	60.42		32.52	36.21	37.12	49.88	57.52	55.59	48.12	31.51
Test Point	1.5	56.47		29.62	32.37	33.48	46.17	53.74	51.49	42.89	21.99

*** Receiver Results - Sources Analysis ***

Receiver Name	Point	Point-2	Point-3
M-1 [1.5m]	44.36	21.12	17.91
M-2 [1.5m]	12.74	16.13	16.29
M-3 [1.5m]	32.37	19.64	18.25
M-4 [1.5m]	18.79	28.99	30.17
M-5 [1.5m]	21.75	59.97	50.33
Test Point [1.5m]	14.09	55.98	46.69

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-1	Point	670.31	224.5	254.58	63	109	-67.53	-0.06	5.53	0	-	-	-	0	-26.2	20.74
M-1	Point	670.31	224.5	254.58	125	107	-67.53	-0.23	-3.86	0	-	-	-	0	-16.1	19.29
M-1	Point	670.31	224.5	254.58	250	107	-67.53	-0.76	-7.46	0	-	-	-	0	-8.6	22.66
M-1	Point	670.31	224.5	254.58	500	111	-67.53	-1.88	-3.38	0	-	-	-	0	-3.2	35.02
M-1	Point	670.31	224.5	254.58	1000	112	-67.53	-3.34	1.1	0	-	-	-	0	0	42.24
M-1	Point	670.31	224.5	254.58	2000	109	-67.53	-6.04	1.66	0	-	-	-	0	1.2	38.29
M-1	Point	670.31	224.5	254.58	4000	104	-67.53	-15.36	1.66	0	-	-	-	0	1	23.78
M-1	Point	670.31	224.5	254.58	8000	98	-67.53	-51.36	1.66	0	-	-	-	0	-1.1	-20.33
M-1	Point-2	1824.41	224.5	421.6	63	109	-76.22	-0.16	5.83	-5.55	-5.55	-	-	0	-26.2	6.69
M-1	Point-2	1824.41	224.5	421.6	125	107	-76.22	-0.62	-5.49	-0.84	-0.84	-	-	0	-16.1	7.72
M-1	Point-2	1824.41	224.5	421.6	250	107	-76.22	-2.07	-7.37	-0.17	-0.17	-	-	0	-8.6	12.57
M-1	Point-2	1824.41	224.5	421.6	500	111	-76.22	-5.1	-3.29	-5.95	-5.95	-	-	0	-3.2	17.23
M-1	Point-2	1824.41	224.5	421.6	1000	112	-76.22	-9.08	1.19	-11.4	-11.4	-	-	0	0	16.48
M-1	Point-2	1824.41	224.5	421.6	2000	109	-76.22	-16.45	1.75	-13.92	-13.92	-	-	0	1.2	5.36
M-1	Point-2	1824.41	224.5	421.6	4000	104	-76.22	-41.8	1.75	-16.65	-16.65	-	-	0	1	-27.93
M-1	Point-2	1824.41	224.5	421.6	8000	98	-76.22	-139.79	1.75	-19.52	-19.52	-	-	0	-1.1	-136.88
M-1	Point-3	1908.29	224.5	408.01	63	109	-76.61	-0.17	5.83	-6.58	-6.58	-	-	0	-26.2	5.27
M-1	Point-3	1908.29	224.5	408.01	125	107	-76.61	-0.65	-5.49	-2.36	-2.36	-	-	0	-16.1	5.79
M-1	Point-3	1908.29	224.5	408.01	250	107	-76.61	-2.16	-7.37	-2.27	-2.27	-	-	0	-8.6	9.99
M-1	Point-3	1908.29	224.5	408.01	500	111	-76.61	-5.34	-3.29	-8.58	-8.58	-	-	0	-3.2	13.98
M-1	Point-3	1908.29	224.5	408.01	1000	112	-76.61	-9.5	1.19	-14.43	-14.43	-	-	0	0	12.65
M-1	Point-3	1908.29	224.5	408.01	2000	109	-76.61	-17.21	1.75	-17.2	-17.2	-	-	0	1.2	0.93
M-1	Point-3	1908.29	224.5	408.01	4000	104	-76.61	-43.72	1.75	-20.09	-20.09	-	-	0	1	-33.67
M-1	Point-3	1908.29	224.5	408.01	8000	98	-76.61	-146.22	1.75	-23.03	-23.03	-	-	0	-1.1	-147.21
M-2	Point	3847.96	223.45	254.58	63	109	-82.7	-0.35	5.92	-4.77	-4.77	-	-	0	-26.2	0.9
M-2	Point	3847.96	223.45	254.58	125	107	-82.7	-1.31	-5.46	0	0.69	-	-	0	-16.1	1.43
M-2	Point	3847.96	223.45	254.58	250	107	-82.7	-4.36	-7.34	0	2.57	-	-	0	-8.6	4
M-2	Point	3847.96	223.45	254.58	500	111	-82.7	-10.77	-3.26	-1.51	-1.51	-	-	0	-3.2	9.56
M-2	Point	3847.96	223.45	254.58	1000	112	-82.7	-19.15	1.22	-4.77	-4.77	-	-	0	0	6.59
M-2	Point	3847.96	223.45	254.58	2000	109	-82.7	-34.7	1.78	-4.77	-4.77	-	-	0	1.2	-10.2
M-2	Point	3847.96	223.45	254.58	4000	104	-82.7	-88.16	1.78	-4.77	-4.77	-	-	0	1	-68.86
M-2	Point	3847.96	223.45	254.58	8000	98	-82.7	-294.83	1.78	-4.77	-4.77	-	-	0	-1.1	-283.63
M-2	Point-2	3033.08	223.45	421.6	63	109	-80.64	-0.27	5.9	-4.92	-4.92	-	-	0	-26.2	2.87
M-2	Point-2	3033.08	223.45	421.6	125	107	-80.64	-1.03	-5.47	0	0.41	-	-	0	-16.1	3.76
M-2	Point-2	3033.08	223.45	421.6	250	107	-80.64	-3.43	-7.35	0	2.02	-	-	0	-8.6	6.98
M-2	Point-2	3033.08	223.45	421.6	500	111	-80.64	-8.49	-3.27	-2.56	-2.56	-	-	0	-3.2	12.85
M-2	Point-2	3033.08	223.45	421.6	1000	112	-80.64	-15.1	1.21	-6.68	-6.68	-	-	0	0	10.8
M-2	Point-2	3033.08	223.45	421.6	2000	109	-80.64	-27.35	1.77	-7.99	-7.99	-	-	0	1.2	-4.01
M-2	Point-2	3033.08	223.45	421.6	4000	104	-80.64	-69.49	1.77	-9.82	-9.82	-	-	0	1	-53.19
M-2	Point-2	3033.08	223.45	421.6	8000	98	-80.64	-232.4	1.77	-12.1	-12.1	-	-	0	-1.1	-226.46
M-2	Point-3	3157.54	223.45	408.01	63	109	-80.99	-0.28	5.9	-4.8	-4.8	-	-	0	-26.2	2.63
M-2	Point-3	3157.54	223.45	408.01	125	107	-80.99	-1.07	-5.47	0	0.65	-	-	0	-16.1	3.37
M-2	Point-3	3157.54	223.45	408.01	250	107	-80.99	-3.58	-7.35	0	2.47	-	-	0	-8.6	6.49
M-2	Point-3	3157.54	223.45	408.01	500	111	-80.99	-8.83	-3.27	-1.7	-1.7	-	-	0	-3.2	13.01
M-2	Point-3	3157.54	223.45	408.01	1000	112	-80.99	-15.72	1.21	-5.16	-5.16	-	-	0	0	11.35
M-2	Point-3	3157.54	223.45	408.01	2000	109	-80.99	-28.47	1.77	-5.52	-5.52	-	-	0	1.2	-3.01
M-2	Point-3	3157.54	223.45	408.01	4000	104	-80.99	-72.34	1.77	-6.16	-6.16	-	-	0	1	-52.72
M-2	Point-3	3157.54	223.45	408.01	8000	98	-80.99	-241.93	1.77	-7.21	-7.21	-	-	0	-1.1	-231.46
M-3	Point	1562.38	204.5	254.58	63	109	-74.88	-0.14	5.8	0	-	-	-	0	-26.2	13.58
M-3	Point	1562.38	204.5	254.58	125	107	-74.88	-0.53	-5.49	0	-	-	-	0	-16.1	10
M-3	Point	1562.38	204.5	254.58	250	107	-74.88	-1.77	-7.38	0	-	-	-	0	-8.6	14.38
M-3	Point	1562.38	204.5	254.58	500	111	-74.88	-4.37	-3.3	0	-	-	-	0	-3.2	25.25
M-3	Point	1562.38	204.5	254.58	1000	112	-74.88	-7.78	1.18	0	-	-	-	0	0	30.53
M-3	Point	1562.38	204.5	254.58	2000	109	-74.88	-14.09	1.74	0	-	-	-	0	1.2	22.98
M-3	Point	1562.38	204.5	254.58	4000	104	-74.88	-35.8	1.74	0	-	-	-	0	1	-3.93
M-3	Point	1562.38	204.5	254.58	8000	98	-74.88	-119.71	1.74	0	-	-	-	0	-1.1	-95.95
M-3	Point-2	2315.51	204.5	421.6	63	109	-78.29	-0.21	5.86	-5.11	-5.11	-	-	0	-26.2	5.05
M-3	Point-2	2315.51	204.5	421.6	125	107	-78.29	-0.79	-5.48	0	0.06	-	-	0	-16.1	6.34
M-3	Point-2	2315.51	204.5	421.6	250	107	-78.29	-2.62	-7.36	0	1.37	-	-	0	-8.6	10.13
M-3	Point-2	2315.51	204.5	421.6	500	111	-78.29	-6.48	-3.28	-3.66	-3.66	-	-	0	-3.2	16.09
M-3	Point-2	2315.51	204.5	421.6	1000	112	-78.29	-11.53	1.2	-8.37	-8.37	-	-	0	0	15.01
M-3	Point-2	2315.51	204.5	421.6	2000	109	-78.29	-20.88	1.76	-10.31	-10.31	-	-	0	1.2	2.48
M-3	Point-2	2315.51	204.5	421.6	4000	104	-78.29	-53.05	1.76	-12.67	-12.67	-	-	0	1	-37.26
M-3	Point-2	2315.51	204.5	421.6	8000	98	-78.29	-177.42	1.76	-15.31	-15.31	-	-	0	-1.1	-172.36
M-3	Point-3	2450.06	204.5	408.01	63	109	-78.78	-0.22	5.87	-5.21	-5.21	-	-	0	-26.2	4.46
M-3	Point-3	2450.06	204.5	408.01	125	107	-78.78	-0.83	-5.48	-0.13	-0.13	-	-	0	-16.1	5.68
M-3	Point-3	2450.06	204.5	408.01	250	107	-78.78	-2.77	-7.36	0	1.05	-	-	0	-8.6	9.49
M-3	Point-3	2450.06	204.5	408.01	500	111	-78.78	-6.86	-3.28	-4.15	-4.15	-	-	0	-3.2	14.73
M-3	Point-3	2450.06	204.5	408.01	1000	112	-78.78	-12.2	1.2	-9.07	-9.07	-	-	0	0	13.16
M-3	Point-3	2450.06	204.5	408.01	2000	109	-78.78	-22.09	1.76	-11.18	-11.18	-	-	0	1.2	-0.1
M-3	Point-3	2450.06	204.5	408.01	4000	104	-78.78	-56.13	1.76	-13.67	-13.67	-	-	0	1	-41.82
M-3	Point-3	2450.06	204.5	408.01	8000	98	-78.78	-187.73	1.76	-16.39	-16.39	-	-	0	-1.1	-184.24
M-4	Point	2712.58	461.64	254.58	63	109	-79.67	-0.24	5.88	-4.83	-4.83	-	-	0	-26.2	3.94
M-4	Point	2712.58	461.64	254.58	125	107	-79.67	-0.92	-5.47	0	0.59	-	-	0	-16.1	4.84
M-4	Point	2712.58	461.64	254.58	250	107	-79.67	-3.07	-7.35	0	2.36	-	-	0	-8.6	8.31
M-4	Point	2712.58	461.64	254.58	500	111	-79.67	-7.59	-3.27	-1.94	-1.94	-	-	0	-3.2	15.34
M-4	Point	2712.58	461.64	254.58	1000	112	-79.67	-13.5	1.21	-5.6	-5.6	-	-	0	0	14.43
M-4	Point	2712.58	461.64	254.58	2000	109	-79.67	-24.46	1.77	-6.3	-6.3	-	-	0	1.2	1.54
M-4	Point	2712.58	461.64	254.58	4000	104	-79.67	-62.15	1.77	-7.43	-7.43	-	-	0	1	-42.48
M-4	Point	2712.58	461.64	254.58	8000	98	-79.67	-207.84	1.77	-9.07	-9.07	-	-	0	-1.1	-197.91
M-4	Point-2	1525.05	461.64	421.6	63	109	-74.67	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	9.02
M-4	Point-2	1525.05	461.64	421.6	125	107	-74.67	-0.52	-5.49	0	0.72	-	-	0	-16.1	10.23
M-4	Point-2	1525.05	461.64	421.6	250	107	-74.67	-1.73	-7.38	0	2.61	-	-	0	-8.6	14.63
M-4	Point-2	1525.05	461.64	421.6	500	111	-74.67	-4.27	-3.3	-1.47	-1.47	-	-	0	-3.2	24.1
M-4	Point-2	1525.05	461.64	421.6	1000	112	-74.67	-7.59	1.18	-4.77	-4.77	-	-	0	0	26.15
M-4	Point-2	1525.05	461.64	421.6	2000	109	-74.67	-13.75	1.74	-4.77	-4.77	-	-	0	1.2	18.75
M-4	Point-2	1525.05	461.64	421.6	4000	104	-74.67	-34.94	1.74	-4.77	-4.77	-	-	0	1	-7.64
M-4	Point-2	1525.05	461.64	421.6	8000	98	-74.67	-116.85	1.74	-4.77	-4.77	-	-	0	-1.1	-97.65
M-4	Point-3	1410.76	461.64	408.01	63	109	-73.99	-0.13	5.78	-4.77	-4.77	-	-	0	-26.2	9.69
M-4	Point-3	1410.76	461.64	408.01	125	107	-73.99	-0.48	-5.48	0	0.71	-	-	0	-16.1	10.95
M-4	Point-3	1410.76	461.64	408.01	250	107	-73.99	-1.6	-7.38	0	2.61	-	-	0	-8.6	15.43
M-4	Point-3	1410.76	461.64	408.01	500	111	-73.99	-3.95	-3.3	-1.47	-1.47	-	-	0	-3.2	25.09
M-4	Point-3	1410.76	461.64	408.01	1000	112	-73.99	-7.02	1.18	-4.77	-4.77	-	-	0	0	27.39
M-4	Point-3	1410.76	461.64	408.01	2000	109	-73.99	-12.72	1.73	-4.77	-4.77	-	-	0	1.2	20.45
M-4	Point-3	1410.76	461.64	408.01	4000	104	-73.99	-32.32	1.73	-4.77	-4.77	-	-	0	1	-4.35
M-4	Point-3	1410.76	461.64	408.01	8000	98	-73.99	-108.09	1.73	-4.77	-4.77	-	-	0	-1.1	-88.22
M-5	Point	1153.41	419.14	254.58	63	109	-72.24	-0.1	5.72	-8.13	-8.13	-	-	0	-26.2	8.05
M-5	Point	1153.41	419.14	254.58	125	107	-72.24	-0.39	-5.36	-4.63	-4.63	-	-	0	-16.1	8.28
M-5	Point	1153.41	419.14	254.58	250	107	-72.24	-1.31	-7.4	-4.9	-4.9	-	-	0	-8.6	12.55
M-5	Point	1153.41	419.14	254.58	500	111	-72.24	-3.23	-3.32	-11.59	-11.59	-	-	0	-3.2	17.42
M-5	Point	1153.41	419.14	254.58	1000	112	-72.24	-5.74	1.16	-17.71	-17.71	-	-	0	0	17.47
M-5	Point	1153.41	419.14	254.58	2000	109	-72.24	-10.4	1.72	-20.61	-20.61	-	-	0	1.2	8.67
M-5	Point	1153.41	419.14	254.58	4000	104	-72.24	-26.43	1.72	-23.56	-23.56	-	-	0	1	-15.51
M-5	Point	1153.41	419.14	254.58	8000	98	-72.24	-88.38	1.72	-25	-25	-	-	0	-1.1	-87
M-5	Point-2	154.71	419.14	421.6	63	109	-54.79	-0.01	3.96	0	-	-	-	0	-26.2	31.96
M-5	Point-2	154.71	419.14	421.6	125	107	-54.79	-0.05	-0.34	0	-	-	-	0	-16.1	35.71
M-5	Point-2	154.71	419.14	421.6	250	107	-54.79	-0.18	-7.51	0	-	-	-	0	-8.6	35.92
M-5	Point-2	154.71	419.14	421.6	500	111	-54.79	-0.43	-3.62	0	-	-	-	0	-3.2	48.96
M-5	Point-2	154.71	419.14	421.6	1000	112	-54.79	-0.77	0.66	0	-	-	-	0	0	57.1
M-5	Point-2	154.71	419.14	421.6	2000	109	-54.79	-1.39	1.19	0	-	-	-	0	1.2	55.2
M-5	Point-2	154.71	419.14	421.6	4000	104	-54.79	-3.54	1.19	0	-	-	-	0	1	47.85
M-5	Point-2	154.71	419.14	421.6	8000	98	-54.79	-11.85	1.19	0	-	-	-	0	-1.1	31.44
M-5	Point-3	268.37	419.14	408.01	63	109	-59.57	-0.02	4.83	-4.77	-4.77	-	-	0	-26.2	23.26
M-5	Point-3	268.37	419.14	408.01	125	107	-59.57	-0.09	-0.85	-3.93	-3.93	-	-	0	-16.1	26.46
M-5	Point-3	268.37	419.14	408.01	250	107	-59.57	-0.3	-7.63	0	2.85	-	-	0	-8.6	30.9
M-5	Point-3	268.37	419.14	408.01	500	111	-59.57	-0.75	-3.57	-1.21	-1.21	-	-	0	-3.2	42.7
M-5	Point-3	268.37	419.14	408.01	1000	112	-59.57	-1.34	0.89	-4.77	-4.77	-	-	0	0	47.21
M-5	Point-3	268.37	419.14	408.01	2000	109	-59.57	-2.42	1.45	-4.77	-4.77	-	-	0	1.2	44.88
M-5	Point-3	268.37	419.14	408.01	4000	104	-59.57	-6.15	1.45	-4.77	-4.77	-	-	0	1	35.95
M-5	Point-3	268.37	419.14	408.01	8000	98	-59.57	-20.56	1.45	-4.78	-4.78	-	-	0	-1.1	13.43
Test Point	Point	1132.57	424.34	254.58	63	109	-72.08	-0.1	5.72	-15.33	-15.33	-	-	0	-26.2	1.01
Test Point	Point	1132.57	424.34	254.58	125	107	-72.08	-0.38	-5.34	-12.89	-12.89	-	-	0	-16.1	0.2
Test Point	Point	1132.57	424.34	254.58	250	107	-72.08	-1.28	-7.4	-13.78	-13.78	-	-	0	-8.6	3.86
Test Point	Point	1132.57	424.34	254.58	500	111	-72.08	-3.17	-3.32	-20.83	-20.83	-	-	0	-3.2	8.4
Test Point	Point	1132.57	424.34	254.58	1000	112	-72.08	-5.64	1.16	-25	-25	-	-	0	0	10.44
Test Point	Point	1132.57	424.34	254.58	2000	109	-72.08	-10.21	1.72	-25	-25	-	-	0	1.2	4.62
Test Point	Point	1132.57	424.34	254.58	4000	104	-72.08	-25.95	1.72	-25	-25	-	-	0	1	-16.31
Test Point	Point	1132.57	424.34	254.58	8000	98	-72.08	-86.78	1.72	-25	-25	-	-	0	-1.1	-85.24
Test Point	Point-2	234.34	424.34	421.6	63	109	-58.4	-0.02	4.66	0	-	-	-	0	-26.2	29.04
Test Point	Point-2	234.34	424.34	421.6	125	107	-58.4	-0.08	-0.65	0	-	-	-	0	-16.1	31.77
Test Point	Point-2	234.34	424.34	421.6	250	107	-58.4	-0.27	-7.64	0	-	-	-	0	-8.6	32.1
Test Point	Point-2	234.34	424.34	421.6	500	111	-58.4	-0.66	-3.59	0	-	-	-	0	-3.2	45.15
Test Point	Point-2	234.34	424.34	421.6	1000	112	-58.4	-1.17	0.84	0	-	-	-	0	0	53.28
Test Point	Point-2	234.34	424.34	421.6	2000	109	-58.4	-2.11	1.4	0	-	-	-	0	1.2	51.09
Test Point	Point-2	234.34	424.34	421.6	4000	104	-58.4	-5.37	1.4	0	-	-	-	0	1	42.63
Test Point	Point-2	234.34	424.34	421.6	8000	98	-58.4	-17.96	1.4	0	-	-	-	0	-1.1	21.94
Test Point	Point-3	380.37	424.34	408.01	63	109	-62.6	-0.03	5.17	-4.77	-4.77	-	-	0	-26.2	20.56
Test Point	Point-3	380.37	424.34	408.01	125	107	-62.6	-0.13	-1.65	-3.12	-3.12	-	-	0	-16.1	23.4
Test Point	Point-3	380.37	424.34	408.01	250	107	-62.6	-0.43	-7.56	0	2.79	-	-	0	-8.6	27.8
Test Point	Point-3	380.37	424.34	408.01	500	111	-62.6	-1.06	-3.48	-1.29	-1.29	-	-	0	-3.2	39.36
Test Point	Point-3	380.37	424.34	408.01	1000	112	-62.6	-1.89	0.99	-4.77	-4.77	-	-	0	0	43.73
Test Point	Point-3	380.37	424.34	408.01	2000	109	-62.6	-3.43	1.55	-4.77	-4.77	-	-	0	1.2	40.95
Test Point	Point-3	380.37	424.34	408.01	4000	104	-62.6	-8.71	1.55	-4.77	-4.77	-	-	0	1	30.46
Test Point	Point-3	380.37	424.34	408.01	8000	98	-62.6	-29.14	1.55	-4.77	-4.77	-	-	0	-1.1	1.93

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5
Test Point	355.58	-8.26	1.5

Point Sources	x	y	Height	Lw	Hz
Point	1133.26	-813.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000
Point-2	121.26	-6.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000
Point-3	-9.74	-112.94	2 -		31.5
-	-	-	-	109	63
-	-	-	-	107	125
-	-	-	-	107	250
-	-	-	-	111	500
-	-	-	-	112	1000
-	-	-	-	109	2000
-	-	-	-	104	4000
-	-	-	-	98	8000

Ground Height Points	x	y	Height
-	134.08	295.24	480
-	514.08	-44.76	475

Ground Height Lines	x	y	Height
-	4476.27	2642.71	163
-	4430.44	2830.57	
-	4390.79	2796.89	
-	4201.84	2828.04	
-	4117.14	2864.1	
-	4098.98	2926.24	
-	4059.83	2971.18	
-	4011.51	2892.73	
-	3906.23	2834.88	
-	3824.28	2863.63	
-	3851.44	2784.45	
-	3811.91	2761.54	
-	3781.83	2689.14	
-	3742	2649.37	
-	3749.31	2601.68	
-	3791.18	2563.94	
-	3764.8	2488.74	
-	3773.32	2376.23	

1029

-	3743.06	2360.98		-
-	3687.72	2389.28		-
-	3639.09	2389.21		-
-	3535.5	2333.86		-
-	3440.6	2250.16		-
-	3416.01	2183.17		-
-	3364.78	2120.28		-
-	3372.67	2100.43		-
-	3355.11	2100.73		-
-	3388.22	1997.46		-
-	3349.65	1865.71		-
-	3366.62	1826.87		-
-	3391.38	1935.46		-
-	3464.55	1963.86		-
-	3486.94	2004.47		-
-	3519.04	2019.65		-
-	3546.25	2121.98		-
-	3653.14	2165.99		-
-	3671.98	2282.77		-
-	3764.26	2303.52		-
-	3856.52	2368.63		-
-	3940.82	2328.01		-
-	3970.3	2287.25		-
-	4019.57	2274.47		-
-	4022.31	2292.04		-
-	4124.68	2342.09		-
-	4101.27	2381.59		-
-	4107.37	2416.37		-
-	4202.15	2523.69		-
-	4283.96	2502.63		-
-	4357.19	2438.58		-
-	4363.94	2332.52		-
-	4265.78	2257.63		-
-	4178.56	2291.79		-
-	4151.03	2283.02		-
-	4199.26	2219.83		-
-	4167.36	2192.97		-
-	4138.45	2094.77		-
-	4067.99	2086.64		-
-	4063.55	2058.89		-
-	4095.48	2017.32		-
-	4128.51	2013.63		-
-	4138.09	1941.77		-
-	4178	1894.95		-
-	4165.88	1861.5		-
-	4255.87	1615.7		-
-	4318.49	1539.34		-
-	4382.92	1398.92		-
-	4485.41	1294.85		-
-	3594.69	3017.68	183	-
-	3645.24	2688.77		-
-	3613.14	2673.89		-
-	3588.39	2622.64		-
-	3596.83	2558.97		-
-	3572.11	2512.01		-
-	3512.54	2496.05		-
-	3419.5	2508.32		-
-	3373.96	2471.03		-
-	3329.68	2386.01		-
-	3307.92	2383.31		-
-	3312.02	2314.45		-
-	3284.28	2210.16		-
-	3232.54	2144.41		-
-	3184.94	2145.89		-
-	3272.35	2083.34		-
-	3281.62	2043.17		-
-	3269.04	2002.9		-
-	3244.3	1991.11		-
-	3235.51	1914.5		-
-	3207.34	1915.27		-
-	3195.96	1871.49		-
-	3135.62	1808.15		-
-	3165.66	1804.61		-
-	3144.44	1776.45		-
-	3162.67	1743.88		-
-	3083.12	1685.93		-
-	3063.16	1693.4		-
-	2964.53	1640.22		-
-	2870.85	1648.8		-
-	2830.17	1605.47		-
-	2799.61	1632.88		-
-	2750.73	1633.43		-
-	2728.07	1601.99		-
-	2736.24	1570.55		-
-	2717.33	1576.64		-
-	2772.53	1483.59		-
-	2770.73	1356.54		-
-	2786.68	1338.7		-
-	2824.25	1350.47		-
-	2866.72	1329.11		-
-	2896.16	1243.66		-
-	2888.14	1125.91		-
-	2923.34	1077.52		-
-	2956.56	955.85		-
-	2996.48	884.09		-
-	3106	804.81		-
-	3159.44	791.41		-
-	3258.78	824.31		-
-	3300.04	766.56		-
-	3308.9	780.48		-
-	3309.72	645.39		-
-	3211.17	593.27		-
-	3183.95	552.44		-
-	3192.45	512.32		-
-	3233.64	466.61		-
-	3233.39	431.04		-
-	3247.93	445.2		-
-	3306.57	429.55		-
-	3296.6	456.5		-
-	3314.19	464.32		-
-	3272.53	524.22		-
-	3289.52	507.2		-
-	3327.76	570.78		-
-	3427.76	650.88		-
-	3459.02	713.82		-
-	3478.57	818.24		-
-	3469.96	930.75		-
-	3492.7	1027.54		-
-	3535.9	1105.11		-
-	3572.11	1196.06		-
-	3512.35	1259.78		-
-	3559.09	1319.83		-
-	3574.64	1332.32		-
-	3538.39	1284.06		-
-	3522.64	1276.34		-
-	3496.08	1359.41		-
-	3342.46	1402.24		-
-	3308.89	1549.61		-
-	3363.1	1632.65		-
-	3364.78	1713.09		-
-	3417.19	1824.5		-
-	3405.82	1944.13		-
-	3506.53	2087.38		-
-	3567.49	2121.6		-
-	3675.23	2212.77		-
-	3699.02	1934.65		-
-	3727.21	1957.08		-
-	3742.56	1942.74		-
-	3753.32	2097.35		-
-	3763.88	1954.75		-
-	3802.63	1981.13		-
-	3811.73	1964		-
-	3823.85	2268.86		-
-	3805.88	2241.66		-
-	3887.74	2191.91		-
-	3899.55	2185.71		-
-	3951.71	2103.3		-
-	4028.1	2028.61		-
-	4037.71	1975.64		-
-	4100.34	1889.99		-
-	4136.68	1849.28		-
-	4108.07	1821.6		-
-	4152.96	1612.55		-
-	4224.07	1599.42		-
-	4299.42	1399.19		-
-	4341.39	1271.46		-
-	4438.56	1173.86		-
-	4485.41	94.57	183	-
-	4491.51	79.63		-
-	4491.51	2998.58	183	-
-	4431.61	2980.04		-
-	4390.07	2913.96		-
-	4202.89	2907.86		-
-	4159.14	2935.69		-
-	4104.34	3020.73		-
-	4321.04	3023.78	183	-
-	4378.05	2984.28		-
-	4417.29	2991.32		-
-	4439.62	3023.78		-
-	4000.84	4502.06	203	-
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-	4413.69	954.84		-
-	4408.65	991.32		-
-	4486.92	1061.56		-
-	4456.85	1075.41		-
-	4400.39	1026.49		-
-	4386.16	1068.37		-
-	4363.81	1036.16		-
-	4335.29	1041.26		-
-	4260.53	1008.27		-
-	4233.87	961.91		-
-	4243.27	906.99		-
-	4317.14	915.7		-
-	4324.26	892.65		-
-	4354.41	888.74		-

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-	1336.6	3023.98			
-	1289.79	3002.04			
-	1344.05	2956.99			
-	1392.81	2726.78			
-	1383	2678.53			
-	1422.31	2663.8			
-	1411.48	2642.5			
-	1439.32	2603.02			
-	1423.25	2539.15			
-	1458.81	2529.71			
-	1464.32	2485.21			
-	1516.68	2478.12			
-	1528.88	2459.87			
-	1497.89	2460.47			
-	1516.75	2415.03			
-	1468.95	2385.68			
-	1453.73	2319.69			
-	1507.38	2295.3			
-	1543.33	2148.74			
-	1634.02	2078.94			
-	1645.21	2037.42			
-	1724.46	2002.85			
-	1782.33	2000.15			
-	1816.22	2021.08			
-	1851.1	2006.75			
-	1837.39	1986.27			
-	1859.37	1914.33			
-	1895.15	1899.22			
-	1933.39	1912.26			
-	1955.87	1848.82			
-	1998.11	1835.06			
-	1965.79	1818.74			
-	1978.24	1786.31			
-	2010.46	1786.33			
-	2019.64	1729.19			
-	2080.23	1713.21			
-	2094.37	1664.51			
-	2159.95	1596.3			
-	2127.86	1539.4			
-	2167.29	1420.6			
-	2175.17	1235.14			
-	2199.51	1154.4			
-	2211.38	905.73			
-	2196.86	874.06			
-	2214.74	741.68			
-	2192.5	626.06			
-	2257.49	566.09			
-	2193.88	529.56			
-	2226.75	411.42			
-	2210.7	372.6			
-	2260.09	381.21			
-	2284.93	319.48			
-	2222.56	222.89			
-	2192.48	214.73			
-	2214.74	137.34			
-	2187.78	117.94			
-	2233.53	78.81			
-	2275.14	145.94			
-	2294.13	240.72			
-	2352.67	250.18			
-	2359.68	179.73			
-	2415.84	114.28			
-	2416.05	140.13			
-	2427.84	134.27			
-	2470.66	48.69			
-	2443.32	5.37			
-	2440.64	-84.52			
-	2365.07	-98.45			
-	2361.46	-131.91			
-	2374.49	-170.51			
-	2488.76	-286.33			
-	2491.94	-310.68			
-	2462.01	-351.35			
-	2488.99	-409.97			
-	2501.09	-390.22			
-	2501.66	-424.52			
-	2516.46	-396.37			
-	2571.78	-2488.93			
-	2682.06	-2271.67			
-	2863.66	-2194.16			
-	2885.31	-2169.16			
-	2871.04	-2146.71			
-	2931.99	-2107.08			
-	2991.66	-2127.12			
-	2977.09	-2114.81			
-	3005.12	-2099.61			
-	2983.03	-2071.94			
-	2996.37	-2037.32			
-	2954.04	-1903.47			
-	2986.4	-1896.42			
-	3004.18	-1838.05			
-	2980.58	-1831.76			
-	3068.64	-1737.92			
-	3065.4	-1692.37			
-	3110.53	-1663.85			
-	3113.79	-1615.26			
-	3102.45	-1596.83			
-	3053.32	-1625.42			
-	3056.97	-1598.07			
-	3086.47	-1577.84			
-	3089.42	-1535.99			
-	3009.11	-1626.41			
-	3015.57	-1538.99			
-	3405.34	-1626.4			
-	3394.23	-1596.95			
-	3353.92	-1642.58			
-	3342.56	-1634.27			
-	3372.99	-1558.32			
-	3323.84	-1511.6			
-	3272.55	-1562.72			
-	3232.59	-1573.47			
-	3263.17	-1618.38			
-	3293.93	-1604.61			
-	3331.93	-1639.69			
-	3351.35	-1736.43			
-	3321.03	-1755.51			
-	3354.48	-1767			
-	3347.44	-1797.1			
-	3320.98	-1805.13			
-	3320.32	-1859.22			
-	3280.38	-1903.78			
-	3244.8	-1895.93			
-	3273.01	-1928.85			
-	3267.09	-2000.28			
-	3302.73	-1996.23			
-	3373.33	-1908.76			
-	3346.08	-2076.55			
-	3289.53	-2223.82			
-	3250.4	-2266.88			
-	3234.67	-2321.36			
-	3214.67	-2303.14			
-	3180.25	-2307.78			
-	3205.75	-2404.22			
-	3179.82	-2373.85			
-	3098.19	-2371.89			
-	3009.23	-2328.42			
-	2943.12	-2345.21			
-	2929.91	-2273.28			
-	2878.19	-2255.49			
-	2716.75	-2337.38			
-	2702.83	-2331.07			
-	2717.29	-2319.26			
-	2693.38	-2331.79

-	3553.81	-1868.27		-
-	3587.93	-1879.06		-
-	3616.75	-1876.63		-
-	3639.27	-1842.75		-
-	3616.63	-1824.65		-
-	3597.69	-1644.77		-
-	3496	-1375.18		-
-	3441.5	-1969.04		-
-	2559.18	-261.97	203	-
-	2525.77	-265.34		-
-	2543.69	-250.32		-
-	2519.25	-231.18		-
-	2507.16	-175.68		-
-	2514.22	-54.6		-
-	2540.88	-107.47		-
-	2523	-125.81		-
-	2543.61	-139.74		-
-	2534.83	-179.13		-
-	2903.28	1743.62	203	-
-	2837.27	1794.44		-
-	2832.79	1872.59		-
-	2803.14	1892.65		-
-	2854.83	1911.14		-
-	2866.96	1979.68		-
-	2909.69	1968.85		-
-	2976.75	1812.77		-
-	2955.08	1762.14		-
-	1327.79	4059.99	203	-
-	1317.27	3980.75		-
-	1285.4	3942.13		-
-	1201.19	3924.44		-
-	1135.83	3938.18		-
-	1141.44	4022.81		-
-	1170.44	4037.38		-
-	1155.12	4080.55		-
-	1190.54	4087.52		-
-	1220.56	4059.3		-
-	1352.38	4111.69		-
-	1556.32	4505.11	203	-
-	1590.73	4352.98		-
-	1579.9	4248.86		-
-	1624.55	4296.83		-
-	1648.89	4298.03		-
-	1584.22	4099.2		-
-	1546.57	4069.14		-
-	1507.42	4095.82		-
-	1530.11	4136.39		-
-	1531.29	4194.93		-
-	1556.77	4196.77		-
-	1580.12	4244.83		-
-	1524.03	4202.36		-
-	1434.38	4186.54		-
-	1407.45	4190.44		-
-	1369.22	4250.42		-
-	1403.34	4359.46		-
-	1443.16	4374.93		-
-	1428.19	4505.11		-
-	3495.03	3017.68	203	-
-	3525.4	2853.66		-
-	3516.24	2750.31		-
-	3493.21	2717.82		-
-	3496.55	2624.36		-
-	3535.33	2562.26		-
-	3502.36	2549.92		-
-	3381.49	2633.49		-
-	3253.71	2618.62		-
-	3166.31	2633.49		-
-	3023.88	2577.24		-
-	2965.45	2608.78		-
-	2845.87	2622.29		-
-	2794.46	2657.88		-
-	2744.48	2651.45		-
-	2693.11	2617.26		-
-	2541.56	2615.14		-
-	2349.84	2562.45		-
-	2360.1	2468.95		-
-	2370.2	2489.43		-
-	2266.19	2480.1		-
-	2243.08	2499.02		-
-	2176.75	2476.32		-
-	2141.47	2484.49		-
-	2083.81	2520.55		-
-	2098.8	2556.08		-
-	2056.04	2556.72		-
-	2015.98	2584.71		-
-	1986.78	2557.85		-
-	1941.4	2553.32		-
-	1947.79	2511.76		-
-	1934.16	2507.23		-
-	1888.35	2536.39		-
-	1906.33	2579.76		-
-	1864.13	2626.46		-
-	1781.33	2657.52		-
-	1763.31	2606.43		-
-	1736.06	2612.3		-
-	1699.74	2667.14		-
-	1699.61	2706.07		-
-	1629.38	2761.91		-
-	1609.79	2825.64		-
-	1583.65	2829		-
-	1559.41	2950.31		-
-	1587.41	2995.32		-
-	1586.67	3071.68		-
-	1608.1	3081.73		-
-	1635.55	3040.36		-
-	1680.17	3037.05		-
-	1663.18	3121.4		-
-	1717.67	3186.02		-
-	1696.4	3242.38		-
-	1748.21	3391.73		-
-	1799.97	3469.49		-
-	1784.79	3510.6		-
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-	1790.81	3973.35		-
-	1836.25	4096.03		-
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-	2354.86	4108.87		-
-	2361.82	4163.83		-
-	2448.4	4169.93		-
-	2546.83	4121.2		-
-	2660.18	4136.77		-
-	2714.98	4169.37		-
-	2762.26	4238.18		-
-	2771.93	4378.1		-
-	2742.1	4459.11		-
-	2760.74	4441.6		-
-	2761.95	4462.42		-
-	2733.8	4486.35		-
-	2653.49	4514.25		-
-	2684.02	4483.98		-
-	2451.45	2052.41	203	-
-	2442.94	2036.45		-
-	2417.36	2062.22		-
-	2423.62	2088.02		-
-	2372.14	2107.16		-
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-	2580.63	4514.25	203	-
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-	2588.68	4292.89		-
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-	2370.12	4406.22		-
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1032

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-	1379.24	2116.28	-
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-	1831.14	1681.37	-
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-	1978.14	-1703.4	-
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-	2001.2	3306.38	
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-	2063.21	3419.72	
-	2016.5	3438.27	
-	2001	3556.64	
-	1961.48	3625.23	
-	1978.37	3663.88	
-	1956.17	3734.06	
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-	1851.84	3887.31	
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-	1897.56	3976.95	
-	1936.81	4004.72	
-	1955.8	4169.6	
-	2098.82	4130.03	
-	2201.63	4024.53	
-	2245.06	3922.96	
-	2276.7	3724.82	
-	2317.44	3707.55	
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-	2366.21	3829.66	
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-	2377.81	3928.96	
-	2398.2	4017.81	
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-	2699.56	3915.02	
-	2760.79	3895.66	
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-	2768.35	3986.64	
-	2815.43	4033.74	
-	2967.51	3974.35	
-	2967.51	4138.53	223
-	2915.73	4060.07	
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-	2822.67	4221.67	
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-	2933.02	4300.99	
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-	2970.55	3810.09	223
-	2862.68	3789.83	
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-	436.1.85	-1627.82			-
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-	-2137.98	2788.85			-
-	-2050.87	2808.69			-
-	-1855.39	2804.42			-
-	-1754.14	2776.95			-
-	-1595.66	2670.3			-
-	-1476.46	2523.53			-
-	-1457.51	2548.69			-
-	-1378.44	2570.5			-
-	-1316.03	2567.03			-
-	-1239.05	2524.17			-
-	-1167.71	2443.36			-
-	-1171.77	2368.52			-
-	-1199.74	2331.9			-
-	-1045.86	2200.84			-
-	-639.74	2094.11			-
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-	-398.01	1829.9			-
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-	-476.69	1252.88			-
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-	-157.19	207.44			-
-	-126.24	189.1			-
-	-94.22	129.63			-
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1046

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-	614.2	-259.86	
-	592.56	-240.75	
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-	-241.73	-1124.64		-
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-	-656.63	-1712.74		-
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-	-750.92	-1956.81		-
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-	-4207.75	-808.48		
-	-4162.7	-783.16		
-	-4102.54	-799.63		
-	-3963.56	-918.46		
-	-3932.3	-997.88		
-	-3894.39	-1155.33		
-	-3911.48	-1203.09		
-	-4015.58	-1309.21		

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-		-4069.4	-1319.72	
-		-4115.67	-1297.33	
-		-4143.48	-1350.12	
-		-4251.18	-1419.21	
-		-4241.78	-1461.77	
-		-4259.89	-1487.11	
-		-4207.43	-1529.94	
-		-4454.17	1469.3	643
-		-4478.97	1442.08	
-		-4518.4	1435.55	
-		-4515.35	744.69	643
-		-4479.13	724.69	
-		-4396.48	733.99	
-		-4361.9	675.51	
-		-4395.89	628.29	
-		-4410.59	475.92	
-		-4512.3	295.59	
-		-3568.13	1475.39	643
-		-3560.17	1448.14	
-		-3579.15	1410.96	
-		-3671.03	1373.23	
-		-3729.2	1403.45	
-		-3763.31	1472.34	
-		-2157.77	1743.62	643
-		-2180.6	1806.73	
-		-2156.72	1872.24	
-		-2084.63	1925.09	
-		-2035.69	1927.83	
-		-1948.92	1847.25	
-		-1896.46	1736.34	
-		-1891.05	1664.09	
-		-1952.83	1600.2	
-		-2046.47	1570.01	
-		-2092.06	1678.8	
-		-4506.2	-666.89	663
-		-4451.56	-688.31	
-		-4285.68	-853.76	
-		-4167.56	-822.83	
-		-4016.85	-894.69	
-		-3936.29	-1127.59	
-		-3944.79	-1191.04	
-		-3982.64	-1240.78	
-		-4070.12	-1260.72	
-		-4150.17	-1241.03	
-		-4211.13	-1338.57	
-		-4350.65	-1444.72	
-		-4347.63	-1529.94	
-		-4512.3	694.37	663
-		-4468.05	655.46	
-		-4481.21	531	
-		-4512.3	469.33	
-		-3607.75	1475.39	663
-		-3611.71	1437.49	
-		-3684.12	1417.46	
-		-3716.98	1436.85	
-		-3721.14	1472.34	
-		-2119.05	1743.62	663
-		-2152.16	1780.39	
-		-2155.88	1834.64	
-		-2043.27	1912.55	
-		-1981.16	1851.91	
-		-1925.64	1714.41	
-		-1958.74	1673.12	
-		-2020.98	1666.61	
-		-4506.2	-716.96	683
-		-4465.65	-713.97	
-		-4403.16	-813.01	
-		-4295.15	-889.83	
-		-4185.87	-864.62	
-		-4067.3	-896.01	
-		-4028.41	-957.2	
-		-3974.36	-1139.77	
-		-4006.41	-1195.98	
-		-4176.67	-1196.54	
-		-4226.42	-1274.51	
-		-4360.15	-1380.31	
-		-4439.99	-1529.94	
-		-4506.2	-750.57	703
-		-4470.68	-767.59	
-		-4401.45	-859.65	
-		-4288.32	-923.27	
-		-4195.13	-894.86	
-		-4097.78	-926.5	
-		-4014.85	-1111.99	
-		-4030.71	-1130.63	
-		-4203.77	-1145.41	
-		-4247.12	-1231.25	
-		-4399.47	-1362.36	
-		-4435.72	-1468.29	
-		-4500.11	-1529.23	
-		-4503.16	-791.51	723
-		-4427.34	-888.76	
-		-4287.91	-947.28	
-		-4195.26	-921.98	
-		-4137.56	-931.57	
-		-4108.73	-962.93	
-		-4077.74	-1059.1	
-		-4088.41	-1081.79	
-		-4219.61	-1078.92	
-		-4288.47	-1220.47	
-		-4372.95	-1277.46	
-		-4500.11	-1438.72	
-		-4503.16	-873.36	743
-		-4398.31	-954.43	
-		-4329.42	-965.65	
-		-4272.98	-1033.14	
-		-4311.19	-1182.42	
-		-4500.11	-1346.35	
-		-4503.16	-924.23	763
-		-4342.94	-1045.18	
-		-4329.39	-1088.89	
-		-4358.82	-1180.58	
-		-4500.11	-1296.15	
-		-4503.16	-980.48	783
-		-4395.56	-1049.23	
-		-4378.15	-1102.63	
-		-4399.26	-1161.42	
-		-4503.16	-1245.77	
-		-4503.16	-1032.33	803
-		-4445.51	-1065.1	
-		-4434.52	-1103.24	
-		-4445.71	-1140.49	
-		-4503.16	-1197	

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Â°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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Noise Mapping Results M 109 with Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
M-5	1.5	100.39	83.36	92.65	87.57	77.14	94.53	95.69	91.67	83.74	65.77	20.97	
M-1	1.5	67.45	59.06	65.9	56.29	44.13	54.49	50.67	40.6	11.88	-92.02	-462.58	
M-3	1.5	73.34	62.12	71.18	63.68	52.04	64.72	61.2	47.96	9.35	-126.21	-607.39	
M-2	1.5	71.22	60.1	69.25	61.29	49.11	62.29	58.24	43.33	-3.65	-174.49	-789.01	
M-4	1.5	79.49	66.08	75.38	67.79	56.8	73.19	72.97	65.11	40.57	-47.17	-357.66	

*** Receiver Results - Sources Analysis ***

Receiver Name	Point
M-5 [1.5m]	100.39
M-1 [1.5m]	67.45
M-3 [1.5m]	73.34
M-2 [1.5m]	71.22
M-4 [1.5m]	79.49

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-5	Point	169.84	419.14	422.48	31.5	179.1	-55.6	0	4.14	-4.88	-4.88	-	-	0	-39.4	83.36
M-5	Point	169.84	419.14	422.48	63	175.3	-55.6	-0.02	4.14	-4.98	-4.98	-	-	0	-26.2	92.65
M-5	Point	169.84	419.14	422.48	125	164.5	-55.6	-0.06	-0.38	-4.79	-4.79	-	-	0	-16.1	87.57
M-5	Point	169.84	419.14	422.48	250	149.1	-55.6	-0.19	-7.57	0	2.03	-	-	0	-8.6	77.14
M-5	Point	169.84	419.14	422.48	500	160	-55.6	-0.48	-3.63	-2.57	-2.57	-	-	0	-3.2	94.53
M-5	Point	169.84	419.14	422.48	1000	158.7	-55.6	-0.85	0.7	-7.27	-7.27	-	-	0	0	95.69
M-5	Point	169.84	419.14	422.48	2000	155.2	-55.6	-1.53	1.24	-8.84	-8.84	-	-	0	1.2	91.67
M-5	Point	169.84	419.14	422.48	4000	151.9	-55.6	-3.89	1.24	-10.91	-10.91	-	-	0	1	83.74
M-5	Point	169.84	419.14	422.48	8000	147.6	-55.6	-13.01	1.24	-13.35	-13.35	-	-	0	-1.1	65.77
M-5	Point	169.84	419.14	422.48	16000	144.9	-55.6	-46.92	1.24	-16.05	-16.05	-	-	0	-6.6	20.97
M-1	Point	1815.25	224.5	422.48	31.5	179.1	-76.18	-0.04	5.83	-10.25	-10.25	-	-	0	-39.4	59.06
M-1	Point	1815.25	224.5	422.48	63	175.3	-76.18	-0.16	5.83	-12.68	-12.68	-	-	0	-26.2	65.9
M-1	Point	1815.25	224.5	422.48	125	164.5	-76.18	-0.62	-5.49	-9.83	-9.83	-	-	0	-16.1	56.29
M-1	Point	1815.25	224.5	422.48	250	149.1	-76.18	-2.06	-7.37	-10.77	-10.77	-	-	0	-8.6	44.13
M-1	Point	1815.25	224.5	422.48	500	160	-76.18	-5.08	-3.29	-17.76	-17.76	-	-	0	-3.2	54.49
M-1	Point	1815.25	224.5	422.48	1000	158.7	-76.18	-9.04	1.19	-24.01	-24.01	-	-	0	0	50.67
M-1	Point	1815.25	224.5	422.48	2000	155.2	-76.18	-16.37	1.75	-25	-25	-	-	0	1.2	40.6
M-1	Point	1815.25	224.5	422.48	4000	151.9	-76.18	-41.59	1.75	-25	-25	-	-	0	1	11.88
M-1	Point	1815.25	224.5	422.48	8000	147.6	-76.18	-139.09	1.75	-25	-25	-	-	0	-1.1	-92.02
M-1	Point	1815.25	224.5	422.48	16000	144.9	-76.18	-501.45	1.75	-25	-25	-	-	0	-6.6	-462.58
M-3	Point	2355.21	204.5	422.48	31.5	179.1	-78.44	-0.05	5.87	-4.96	-4.96	-	-	0	-39.4	62.12
M-3	Point	2355.21	204.5	422.48	63	175.3	-78.44	-0.21	5.87	-5.13	-5.13	-	-	0	-26.2	71.18
M-3	Point	2355.21	204.5	422.48	125	164.5	-78.44	-0.8	-5.48	0	0.02	-	-	0	-16.1	63.68
M-3	Point	2355.21	204.5	422.48	250	149.1	-78.44	-2.67	-7.36	0	1.3	-	-	0	-8.6	52.04
M-3	Point	2355.21	204.5	422.48	500	160	-78.44	-6.59	-3.28	-3.77	-3.77	-	-	0	-3.2	64.72
M-3	Point	2355.21	204.5	422.48	1000	158.7	-78.44	-11.72	1.2	-8.54	-8.54	-	-	0	0	61.2
M-3	Point	2355.21	204.5	422.48	2000	155.2	-78.44	-21.24	1.76	-10.52	-10.52	-	-	0	1.2	47.96
M-3	Point	2355.21	204.5	422.48	4000	151.9	-78.44	-53.96	1.76	-12.91	-12.91	-	-	0	1	9.35
M-3	Point	2355.21	204.5	422.48	8000	147.6	-78.44	-180.46	1.76	-15.58	-15.58	-	-	0	-1.1	-126.21
M-3	Point	2355.21	204.5	422.48	16000	144.9	-78.44	-650.6	1.76	-18.4	-18.4	-	-	0	-6.6	-607.39
M-2	Point	3025.51	223.45	422.48	31.5	179.1	-80.62	-0.07	5.9	-4.81	-4.81	-	-	0	-39.4	60.1
M-2	Point	3025.51	223.45	422.48	63	175.3	-80.62	-0.27	5.9	-4.86	-4.86	-	-	0	-26.2	69.25
M-2	Point	3025.51	223.45	422.48	125	164.5	-80.62	-1.03	-5.47	0	0.53	-	-	0	-16.1	61.29
M-2	Point	3025.51	223.45	422.48	250	149.1	-80.62	-3.43	-7.35	0	2.24	-	-	0	-8.6	49.11
M-2	Point	3025.51	223.45	422.48	500	160	-80.62	-8.47	-3.27	-2.16	-2.16	-	-	0	-3.2	62.29
M-2	Point	3025.51	223.45	422.48	1000	158.7	-80.62	-15.06	1.21	-5.99	-5.99	-	-	0	0	58.24
M-2	Point	3025.51	223.45	422.48	2000	155.2	-80.62	-27.28	1.77	-6.94	-6.94	-	-	0	1.2	43.33
M-2	Point	3025.51	223.45	422.48	4000	151.9	-80.62	-69.32	1.77	-8.38	-8.38	-	-	0	1	-3.65
M-2	Point	3025.51	223.45	422.48	8000	147.6	-80.62	-231.82	1.77	-10.33	-10.33	-	-	0	-1.1	-174.49
M-2	Point	3025.51	223.45	422.48	16000	144.9	-80.62	-835.77	1.77	-12.69	-12.69	-	-	0	-6.6	-789.01
M-4	Point	1496.32	461.64	422.48	31.5	179.1	-74.6	-0.03	5.79	-4.77	-4.77	-	-	0	-39.4	66.08
M-4	Point	1496.32	461.64	422.48	63	175.3	-74.6	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	75.38
M-4	Point	1496.32	461.64	422.48	125	164.5	-74.6	-0.51	-5.49	0	0.72	-	-	0	-16.1	67.79
M-4	Point	1496.32	461.64	422.48	250	149.1	-74.6	-1.71	-7.38	0	2.61	-	-	0	-8.6	56.8
M-4	Point	1496.32	461.64	422.48	500	160	-74.6	-4.24	-3.3	-1.47	-1.47	-	-	0	-3.2	73.19
M-4	Point	1496.32	461.64	422.48	1000	158.7	-74.6	-7.54	1.18	-4.77	-4.77	-	-	0	0	72.97
M-4	Point	1496.32	461.64	422.48	2000	155.2	-74.6	-13.65	1.74	-4.77	-4.77	-	-	0	1.2	65.11
M-4	Point	1496.32	461.64	422.48	4000	151.9	-74.6	-34.7	1.74	-4.77	-4.77	-	-	0	1	40.57
M-4	Point	1496.32	461.64	422.48	8000	147.6	-74.6	-116.03	1.74	-4.77	-4.77	-	-	0	-1.1	-47.17
M-4	Point	1496.32	461.64	422.48	16000	144.9	-74.6	-418.32	1.74	-4.77	-4.77	-	-	0	-6.6	-357.66

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5

Point Sources	x	y	Height	Lw	Hz	
Point	223773.84	-610840.15	2	179.1	31.5	
-	-	-	-	175.3	63	
-	-	-	-	164.5	125	
-	-	-	-	149.1	250	
-	-	-	-	160	500	
-	-	-	-	158.7	1000	
-	-	-	-	155.2	2000	
-	-	-	-	151.9	4000	
-	-	-	-	147.6	8000	
-	-	-	-	144.9	16000	

Ground Height Points	x	y	Height
-	224184.6	-610862.89	476
-	222718.9	-610748.33	453

Ground Height Lines	x	y	Height
-	228142.27	-608184.3	163
-	228096.44	-607996.43	
-	228056.79	-608030.11	
-	227867.84	-607998.96	
-	227783.14	-607962.9	
-	227764.98	-607900.76	
-	227725.83	-607855.82	
-	227677.51	-607934.28	
-	227572.23	-607992.12	
-	227490.28	-607963.37	
-	227517.44	-608042.55	
-	227477.91	-608065.46	
-	227447.82	-608137.86	
-	227408	-608177.63	
-	227415.31	-608225.32	
-	227457.18	-608263.06	
-	227430.8	-608338.26	
-	227439.32	-608450.77	
-	227409.06	-608466.02	
-	227353.72	-608437.72	
-	227305.09	-608437.79	
-	227201.5	-608493.14	
-	227106.6	-608576.84	
-	227082.01	-608643.83	
-	227030.78	-608706.72	
-	227038.67	-608726.57	
-	227021.11	-608726.27	
-	227054.22	-608829.54	
-	227015.64	-608961.29	
-	227032.62	-609000.13	
-	227057.38	-608891.54	
-	227130.55	-608863.14	
-	227152.94	-608822.53	
-	227185.04	-608807.35	
-	227212.25	-608705.02	
-	227319.14	-608661.01	
-	227337.98	-608544.23	
-	227430.26	-608523.48	
-	227522.52	-608458.37	
-	227606.82	-608498.99	
-	227636.3	-608539.75	
-	227685.57	-608552.53	
-	227688.31	-608534.96	
-	227790.68	-608484.91	
-	227767.27	-608445.41	
-	227773.37	-608410.63	
-	227868.15	-608303.31	
-	227949.96	-608324.38	
-	228023.19	-608388.42	
-	228029.94	-608494.48	
-	227931.78	-608569.37	
-	227844.56	-608535.21	
-	227817.03	-608543.98	
-	227865.26	-608607.17	
-	227833.36	-608634.03	
-	227804.45	-608732.23	
-	227733.99	-608740.36	
-	227729.55	-608768.11	
-	227761.48	-608809.68	
-	227794.51	-608813.37	
-	227804.09	-608885.23	
-	227843.99	-608932.05	
-	227831.88	-608965.5	
-	227921.87	-609211.3	
-	227984.49	-609287.66	
-	228048.91	-609428.08	
-	228151.41	-609532.15	
-	227260.69	-607809.32	183
-	227311.24	-608138.23	
-	227279.14	-608153.11	
-	227254.39	-608204.36	
-	227262.83	-608268.03	
-	227238.11	-608314.99	
-	227178.53	-608330.95	
-	227085.5	-608318.68	
-	227039.96	-608355.98	
-	226995.68	-608440.99	
-	226973.92	-608443.69	
-	226978.02	-608512.55	
-	226950.28	-608616.84	
-	226898.54	-608682.59	
-	226850.94	-608681.11	
-	226938.35	-608743.66	
-	226947.62	-608783.83	
-	226935.04	-608824.1	

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-	225119.73	-608507.31		
-	225134.95	-608441.32		
-	225182.75	-608411.97		
-	225163.89	-608366.53		
-	225194.88	-608367.13		
-	225182.68	-608348.88		
-	225130.32	-608341.79		
-	225124.81	-608297.29		
-	225089.25	-608287.85		
-	225105.32	-608223.98		
-	225077.48	-608184.5		
-	225088.31	-608163.2		
-	225049	-608148.47		
-	225058.81	-608100.22		
-	225004.27	-607949.81		
-	225010.05	-607870.01		
-	224955.79	-607824.96		
-	225002.6	-607803.02		
-	224984.83	-607785.77		
-	225023.99	-607763.42		
-	225016.08	-607743.33		
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-	219823.78	-611844.3	
-	219816.77	-611916.58	
-	219834.93	-611986.6	
-	219796.77	-612134.39	
-	219741.96	-612213.67	
-	219590.06	-612259.06	
-	219641.45	-612356.94	
-	220177.12	-609351.61	603
-	220153.24	-609416.87	
-	220019.37	-609523.95	
-	219412.26	-609696.5	
-	219355.95	-609724.54	
-	219361.05	-609765.27	
-	219332.68	-609799.76	
-	219171.3	-609728.49	
-	219302.53	-609927.61	
-	219369.28	-609978.5	
-	219389.3	-610023.23	
-	219481.75	-610119.42	
-	219505.21	-610264.15	
-	219474.37	-610379.53	
-	219410.8	-610431.67	
-	219406.46	-610463.93	
-	219239.55	-610643.34	
-	219200.42	-610803.74	
-	219166.64	-610841.84	
-	219173.33	-610873.98	
-	219156.75	-610896.24	
-	221722.08	-608748.1	603
-	221766.53	-608860.49	
-	221752.74	-608928.23	
-	221818.27	-609053.85	
-	221852.31	-609071.96	
-	221930.98	-609038.12	
-	221952.52	-609003.83	
-	221991.74	-609000.34	
-	222053.1	-609099.21	
-	222085.36	-609115.62	
-	222104.46	-609226.05	
-	222078.96	-609320.5	
-	221924.3	-609356.1	
-	221808.41	-609334.62	
-	221631.91	-609356.62	
-	221581.87	-609344.82	
-	221532.29	-609296.96	
-	221505.97	-609199.21	
-	221421.59	-609057.04	
-	221448.19	-608954.42	
-	221526.13	-608877.44	
-	221524.38	-608803.43	
-	221551.96	-608750.69	
-	221701.53	-608681.07	
-	222366.24	-609083.38	603
-	222400.6	-609052.68	
-	222451.57	-609048.04	
-	222524.89	-609115.05	
-	222544.38	-609108.19	
-	222597.88	-609186.99	
-	222601.43	-609262.54	
-	222542.81	-609272.05	
-	222519.67	-609316	
-	222474.8	-609341.47	
-	222308.39	-609278.32	
-	222283.99	-609244.96	
-	222275.08	-609164.85	
-	222321.3	-609105.44	
-	219159.79	-611365.52	623
-	219411.28	-611565.97	
-	219542.53	-611581.67	
-	219620.04	-611613.32	
-	219760.92	-611756.38	
-	219795.2	-611959.11	
-	219789.01	-612017	
-	219738.87	-612131.35	
-	219656.56	-612210.58	
-	219574.4	-612190.85	
-	219481.59	-612247.5	
-	219559.16	-612356.94	
-	219908.14	-611733.68	623
-	219866.91	-611735.08	
-	219790.86	-611694.21	
-	219751	-611705.34	
-	219695.12	-611634.81	
-	219744.7	-611626.18	
-	219850.53	-611667.51	
-	219897.42	-611698.61	
-	220132.81	-609351.61	623
-	220117.98	-609424.38	
-	220007.16	-609481.26	
-	219883.34	-609489.76	
-	219729.23	-609452.34	
-	219672.8	-609464.48	
-	219415.33	-609397.83	
-	219324.19	-609464.16	
-	219147.6	-609530.73	
-	219150.65	-609996.97	623
-	219272.33	-610005.49	
-	219378.71	-610100.36	
-	219406.59	-610183.93	
-	219367.64	-610349	
-	219156.75	-610649.35	
-	221689.64	-608892.94	623
-	221835.37	-609128.27	
-	221977.69	-609091	
-	222050.7	-609141.34	
-	222076.13	-609217.87	
-	222056.45	-609282.56	
-	222021.8	-609298.13	
-	221760.52	-609251.23	
-	221710.28	-609303.24	
-	221637.53	-609315.87	
-	221563.79	-609274.94	
-	221550.66	-609183.97	
-	221466.01	-609075.86	
-	221466.74	-608970	
-	221501.38	-608921.41	
-	221582.61	-608883.24	
-	221560.65	-608861.21	
-	221570.78	-608821.26	
-	221631.81	-608761.97	
-	221695.83	-608767.95	
-	221727.58	-608802.84	
-	221715.06	-608875.81	
-	222483.57	-609083.38	623
-	222520.9	-609211.69	
-	222502.77	-609262.53	
-	222442.42	-609276.84	
-	222327.01	-609233.01	
-	222313.98	-609198.19	
-	222325.94	-609169.27	
-	222438.8	-609079.85	
-	219159.79	-611444.77	643
-	219250.91	-611497.14	
-	219376.11	-611619.87	
-	219458.25	-611635.49	
-	219503.3	-611610.16	
-	219563.46	-611626.64	
-	219702.44	-611745.46	
-	219733.7	-611824.88	
-	219771.61	-611982.33	
-	219754.52	-612030.09	
-	219650.42	-612136.21	
-	219596.6	-612146.72	
-	219550.32	-612124.33	
-	219522.52	-612177.12	
-	219414.82	-612246.21	
-	219424.21	-612288.77	
-	219406.11	-612314.11	
-	219458.57	-612356.94	

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-	219211.83	-609357.7	643
-	219187.03	-609384.92	
-	219147.6	-609391.45	
-	219150.65	-610082.31	643
-	219186.87	-610102.31	
-	219269.52	-610093.01	
-	219304.1	-610151.49	
-	219270.11	-610198.72	
-	219255.41	-610351.08	
-	219153.7	-610531.41	
-	220097.87	-609351.61	643
-	220105.83	-609378.86	
-	220086.84	-609416.04	
-	219994.97	-609453.77	
-	219936.8	-609423.55	
-	219902.69	-609354.66	
-	221508.23	-609083.38	643
-	221485.4	-609020.27	
-	221509.27	-608954.76	
-	221581.37	-608901.92	
-	221630.31	-608899.17	
-	221717.08	-608979.75	
-	221769.54	-609090.66	
-	221774.95	-609162.91	
-	221713.17	-609226.8	
-	221619.53	-609256.99	
-	221573.94	-609148.2	
-	219159.79	-611493.89	663
-	219214.44	-611515.31	
-	219380.32	-611680.76	
-	219498.44	-611649.83	
-	219649.14	-611721.69	
-	219729.71	-611954.59	
-	219721.21	-612018.04	
-	219683.36	-612067.78	
-	219595.88	-612087.72	
-	219515.83	-612068.03	
-	219454.87	-612165.57	
-	219315.35	-612271.72	
-	219318.36	-612356.94	
-	219153.7	-610132.63	663
-	219197.95	-610171.54	
-	219184.79	-610296	
-	219153.7	-610357.67	
-	220058.25	-609351.61	663
-	220054.29	-609389.51	
-	219981.88	-609409.55	
-	219949.01	-609390.15	
-	219944.86	-609354.66	
-	221546.95	-609083.38	663
-	221513.84	-609046.61	
-	221510.12	-608992.36	
-	221622.73	-608914.45	
-	221684.84	-608975.09	
-	221740.36	-609112.59	
-	221707.26	-609153.88	
-	221645.02	-609160.4	
-	219159.79	-611543.96	683
-	219200.35	-611540.97	
-	219262.84	-611640.01	
-	219370.85	-611716.83	
-	219480.13	-611691.62	
-	219598.7	-611723.01	
-	219637.59	-611784.2	
-	219691.64	-611966.77	
-	219659.58	-612022.98	
-	219489.33	-612023.54	
-	219439.58	-612101.51	
-	219305.85	-612207.31	
-	219226.01	-612356.94	
-	219159.79	-611577.57	703
-	219195.32	-611594.59	
-	219264.55	-611686.65	
-	219377.68	-611750.27	
-	219470.87	-611721.86	
-	219568.22	-611753.51	
-	219651.15	-611938.99	
-	219635.29	-611957.63	
-	219462.23	-611972.41	
-	219418.88	-612058.25	
-	219266.53	-612189.36	
-	219230.28	-612295.29	
-	219165.89	-612356.24	
-	219162.84	-611618.51	723
-	219238.66	-611715.76	
-	219378.09	-611774.28	
-	219470.74	-611748.98	
-	219528.44	-611758.58	
-	219557.27	-611789.93	
-	219588.26	-611886.1	
-	219577.59	-611908.8	
-	219446.39	-611905.92	
-	219377.53	-612047.47	
-	219293.05	-612104.46	
-	219165.89	-612265.72	
-	219162.84	-611700.36	743
-	219267.69	-611781.43	
-	219336.58	-611792.65	
-	219393.02	-611860.14	
-	219354.81	-612009.42	
-	219165.89	-612173.36	
-	219162.84	-611751.23	763
-	219323.06	-611872.18	
-	219336.61	-611915.89	
-	219307.18	-612007.58	
-	219165.89	-612123.15	
-	219162.84	-611807.48	783
-	219270.44	-611876.23	
-	219287.85	-611929.63	
-	219266.74	-611988.42	
-	219162.84	-612072.77	
-	219162.84	-611859.33	803
-	219220.49	-611892.1	
-	219231.48	-611930.24	
-	219220.29	-611967.49	
-	219162.84	-612024	
-	223733.07	-610796.57	420
-	223735.15	-610837.38	
-	223715.21	-610861.92	
-	223742.95	-610882.22	
-	223771.02	-610873.83	
-	223798.61	-610864.32	
-	223804.87	-610858.06	
-	223809.74	-610841.82	
-	223812.29	-610827.68	
-	223812.76	-610811.91	
-	223810.9	-610800.55	
-	223808.58	-610789.65	
-	223805.11	-610767.62	
-	223805.34	-610767.62	
-	223734.09	-610868.46	420
-	223763.47	-610853.96	
-	223792.34	-610843.21	
-	223796.22	-610833.83	
-	223799.34	-610840.15	424
-	223793.15	-610857.71	
-	223744.84	-610874.83	

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Â°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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Noise Mapping Results / No Berm

*** Receiver Results - Summary ***

Receiver Name	Height (m)	Total dB(A)	31.5Hz	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
M-1	1.5	75.44	64.22	73.15	65.55	54.79	66.99	64.12	52.61	21	-86.65	-463.6	
M-2	1.5	71	60.01	69.12	61.24	49.06	61.66	57.2	41.75	-5.92	-177.9	-795.41	
M-3	1.5	73.5	62.23	71.3	63.8	52.17	64.98	61.55	48.45	10.25	-123.75	-599.18	
M-4	1.5	79.49	66.08	75.38	67.79	56.8	73.18	72.96	65.1	40.56	-47.19	-357.75	
M-5	1.5	107.17	88.55	97.93	92.78	77.57	97.51	103.37	100.95	95.19	80.07	39.47	

*** Receiver Results - Sources Analysis ***

Receiver Name	Source
M-1 [1.5m]	75.44
M-2 [1.5m]	71
M-3 [1.5m]	73.5
M-4 [1.5m]	79.49
M-5 [1.5m]	107.17

*** Receiver Results - Full Detail ***

Receiver Name	Source Name	Distance to source (m)	Height including ground level (m)	Source height including ground level (m)	Frequency (Hz)	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge)	Ab (lateral 1)	Ab (lateral 2)	Adjustment	A-Weighting	Lp
M-1	Source	1815.25	224.5	421.21	31.5	179.1	-76.26	-0.04	5.83	-5	-5	-	-	0	-39.4	64.22
M-1	Source	1815.25	224.5	421.21	63	175.3	-76.26	-0.16	5.83	-5.35	-5.35	-	-	0	-26.2	73.15
M-1	Source	1815.25	224.5	421.21	125	164.5	-76.26	-0.62	-5.49	-0.47	-0.47	-	-	0	-16.1	65.55
M-1	Source	1815.25	224.5	421.21	250	149.1	-76.26	-2.08	-7.37	0	0.41	-	-	0	-8.6	54.79
M-1	Source	1815.25	224.5	421.21	500	160	-76.26	-5.13	-3.29	-5.13	-5.13	-	-	0	-3.2	66.99
M-1	Source	1815.25	224.5	421.21	1000	158.7	-76.26	-9.12	1.19	-10.38	-10.38	-	-	0	0	64.12
M-1	Source	1815.25	224.5	421.21	2000	155.2	-76.26	-16.52	1.75	-12.75	-12.75	-	-	0	1.2	52.61
M-1	Source	1815.25	224.5	421.21	4000	151.9	-76.26	-41.99	1.75	-15.4	-15.4	-	-	0	1	21
M-1	Source	1815.25	224.5	421.21	8000	147.6	-76.26	-140.42	1.75	-18.22	-18.22	-	-	0	-1.1	-86.65
M-1	Source	1815.25	224.5	421.21	16000	144.9	-76.26	-506.25	1.75	-21.13	-21.13	-	-	0	-6.6	-463.6
M-2	Source	3025.51	223.45	421.21	31.5	179.1	-80.65	-0.07	5.9	-4.86	-4.86	-	-	0	-39.4	60.01
M-2	Source	3025.51	223.45	421.21	63	175.3	-80.65	-0.27	5.9	-4.94	-4.94	-	-	0	-26.2	69.12
M-2	Source	3025.51	223.45	421.21	125	164.5	-80.65	-1.03	-5.47	0	0.36	-	-	0	-16.1	61.24
M-2	Source	3025.51	223.45	421.21	250	149.1	-80.65	-3.44	-7.35	0	1.93	-	-	0	-8.6	49.06
M-2	Source	3025.51	223.45	421.21	500	160	-80.65	-8.5	-3.27	-2.71	-2.71	-	-	0	-3.2	61.66
M-2	Source	3025.51	223.45	421.21	1000	158.7	-80.65	-15.13	1.21	-6.93	-6.93	-	-	0	0	57.2
M-2	Source	3025.51	223.45	421.21	2000	155.2	-80.65	-27.4	1.77	-8.36	-8.36	-	-	0	1.2	41.75
M-2	Source	3025.51	223.45	421.21	4000	151.9	-80.65	-69.63	1.77	-10.3	-10.3	-	-	0	1	-5.92
M-2	Source	3025.51	223.45	421.21	8000	147.6	-80.65	-232.86	1.77	-12.66	-12.66	-	-	0	-1.1	-177.9
M-2	Source	3025.51	223.45	421.21	16000	144.9	-80.65	-839.53	1.77	-15.3	-15.3	-	-	0	-6.6	-795.41
M-3	Source	2355.21	204.5	421.21	31.5	179.1	-78.33	-0.05	5.86	-4.95	-4.95	-	-	0	-39.4	62.23
M-3	Source	2355.21	204.5	421.21	63	175.3	-78.33	-0.21	5.86	-5.12	-5.12	-	-	0	-26.2	71.3
M-3	Source	2355.21	204.5	421.21	125	164.5	-78.33	-0.79	-5.48	0	0.04	-	-	0	-16.1	63.8
M-3	Source	2355.21	204.5	421.21	250	149.1	-78.33	-2.63	-7.36	0	1.34	-	-	0	-8.6	52.17
M-3	Source	2355.21	204.5	421.21	500	160	-78.33	-6.51	-3.28	-3.7	-3.7	-	-	0	-3.2	64.98
M-3	Source	2355.21	204.5	421.21	1000	158.7	-78.33	-11.58	1.2	-8.44	-8.44	-	-	0	0	61.55
M-3	Source	2355.21	204.5	421.21	2000	155.2	-78.33	-20.98	1.76	-10.4	-10.4	-	-	0	1.2	48.45
M-3	Source	2355.21	204.5	421.21	4000	151.9	-78.33	-53.3	1.76	-12.77	-12.77	-	-	0	1	10.25
M-3	Source	2355.21	204.5	421.21	8000	147.6	-78.33	-178.26	1.76	-15.42	-15.42	-	-	0	-1.1	-123.75
M-3	Source	2355.21	204.5	421.21	16000	144.9	-78.33	-642.67	1.76	-18.24	-18.24	-	-	0	-6.6	-599.18
M-4	Source	1496.32	461.64	421.21	31.5	179.1	-74.61	-0.03	5.79	-4.77	-4.77	-	-	0	-39.4	66.08
M-4	Source	1496.32	461.64	421.21	63	175.3	-74.61	-0.14	5.79	-4.77	-4.77	-	-	0	-26.2	75.38
M-4	Source	1496.32	461.64	421.21	125	164.5	-74.61	-0.51	-5.49	0	0.72	-	-	0	-16.1	67.79
M-4	Source	1496.32	461.64	421.21	250	149.1	-74.61	-1.72	-7.38	0	2.61	-	-	0	-8.6	56.8
M-4	Source	1496.32	461.64	421.21	500	160	-74.61	-4.24	-3.3	-1.47	-1.47	-	-	0	-3.2	73.18
M-4	Source	1496.32	461.64	421.21	1000	158.7	-74.61	-7.54	1.18	-4.77	-4.77	-	-	0	0	72.96
M-4	Source	1496.32	461.64	421.21	2000	155.2	-74.61	-13.66	1.74	-4.77	-4.77	-	-	0	1.2	65.1
M-4	Source	1496.32	461.64	421.21	4000	151.9	-74.61	-34.7	1.74	-4.77	-4.77	-	-	0	1	40.56
M-4	Source	1496.32	461.64	421.21	8000	147.6	-74.61	-116.05	1.74	-4.77	-4.77	-	-	0	-1.1	-47.19
M-4	Source	1496.32	461.64	421.21	16000	144.9	-74.61	-418.41	1.74	-4.77	-4.77	-	-	0	-6.6	-357.75
M-5	Source	169.84	419.14	421.21	31.5	179.1	-55.21	0	4.06	0	-	-	-	0	-39.4	88.55
M-5	Source	169.84	419.14	421.21	63	175.3	-55.21	-0.01	4.06	0	-	-	-	0	-26.2	97.93
M-5	Source	169.84	419.14	421.21	125	164.5	-55.21	-0.06	-0.36	0	-	-	-	0	-16.1	92.78
M-5	Source	169.84	419.14	421.21	250	149.1	-55.21	-0.18	-7.54	0	-	-	-	0	-8.6	77.57
M-5	Source	169.84	419.14	421.21	500	160	-55.21	-0.45	-3.62	0	-	-	-	0	-3.2	97.51
M-5	Source	169.84	419.14	421.21	1000	158.7	-55.21	-0.81	0.68	0	-	-	-	0	0	103.37
M-5	Source	169.84	419.14	421.21	2000	155.2	-55.21	-1.46	1.22	0	-	-	-	0	1.2	100.95
M-5	Source	169.84	419.14	421.21	4000	151.9	-55.21	-3.72	1.22	0	-	-	-	0	1	95.19
M-5	Source	169.84	419.14	421.21	8000	147.6	-55.21	-12.44	1.22	0	-	-	-	0	-1.1	80.07
M-5	Source	169.84	419.14	421.21	16000	144.9	-55.21	-44.84	1.22	0	-	-	-	0	-6.6	39.47

*** Objects ***

Receivers	x	y	Height
M-5	223928.1	-610911.14	1.5
M-1	225443.6	-611524.14	1.5
M-3	226117.97	-610772.77	1.5
M-2	224221.6	-607854.58	1.5
M-4	222268.48	-610680.36	1.5

Point Sources	x	y	Height	Lw	Hz
Source	110.34	-11.5	2	179.1	31.5
-	-	-		175.3	63
-	-	-		164.5	125
-	-	-		149.1	250
-	-	-		160	500
-	-	-		158.7	1000
-	-	-		155.2	2000
-	-	-		151.9	4000
-	-	-		147.6	8000
-	-	-		144.9	16000

Ground Height Points	x	y	Height
-	134.08	295.24	480
-	514.08	-44.76	475

Ground Height Lines	x	y	Height
-	4476.27	2642.71	163
-	4430.44	2830.57	
-	4390.79	2796.89	
-	4201.84	2828.04	
-	4117.14	2864.1	
-	4098.98	2926.24	
-	4059.83	2971.18	
-	4011.51	2892.73	
-	3906.23	2834.88	
-	3824.28	2863.63	
-	3851.44	2784.45	
-	3811.91	2761.54	
-	3781.83	2689.14	
-	3742	2649.37	
-	3749.31	2601.68	
-	3791.18	2563.94	
-	3764.8	2488.74	
-	3773.32	2376.23	
-	3743.06	2360.98	
-	3687.72	2389.28	
-	3639.09	2389.21	
-	3535.5	2333.86	
-	3440.6	2250.16	
-	3416.01	2183.17	
-	3364.78	2120.28	
-	3372.67	2100.43	
-	3355.11	2100.73	
-	3388.22	1997.46	
-	3349.65	1865.71	
-	3366.62	1826.87	
-	3391.38	1935.46	
-	3464.55	1963.86	
-	3486.94	2004.47	
-	3519.04	2019.65	
-	3546.25	2121.98	
-	3653.14	2165.99	
-	3671.98	2282.77	
-	3764.26	2303.52	
-	3856.52	2368.63	
-	3940.82	2328.01	
-	3970.3	2287.25	
-	4019.57	2274.47	
-	4022.31	2292.04	
-	4124.68	2342.09	
-	4101.27	2381.59	
-	4107.37	2416.37	
-	4202.15	2523.69	
-	4283.96	2502.63	
-	4357.19	2438.58	
-	4363.94	2332.52	
-	4265.78	2257.63	
-	4178.56	2291.79	
-	4151.03	2283.02	
-	4199.26	2219.83	
-	4167.36	2192.97	
-	4138.45	2094.77	
-	4067.99	2086.64	
-	4063.55	2058.89	
-	4095.48	2017.32	
-	4128.51	2013.63	
-	4138.09	1941.77	
-	4178	1894.95	
-	4165.88	1861.5	
-	4255.87	1615.7	
-	4318.49	1539.34	
-	4382.92	1398.92	
-	4485.41	1294.85	
-	3594.69	3017.68	183
-	3645.24	2688.77	
-	3613.14	2673.89	
-	3588.39	2622.64	
-	3596.83	2558.97	
-	3572.11	2512.01	
-	3512.54	2496.05	
-	3419.5	2508.32	
-	3373.96	2471.03	
-	3329.68	2386.01	
-	3307.92	2383.31	
-	3312.02	2314.45	
-	3284.28	2210.16	
-	3232.54	2144.41	
-	3184.94	2145.89	
-	3272.35	2083.34	
-	3281.62	2043.17	
-	3269.04	2002.9	
-	3244.3	1991.11	
-	3235.51	1914.5	
-	3207.34	1915.27	
-	3195.96	1871.49	
-	3135.62	1808.15	
-	3165.66	1804.61	
-	3144.44	1776.45	
-	3162.67	1743.88	
-	3083.12	1685.93	
-	3063.16	1693.4	
-	2964.53	1640.22	
-	2870.85	1648.8	
-	2830.17	1605.47	
-	2799.61	1632.88	
-	2750.73	1633.43	
-	2728.07	1601.99	
-	2736.24	1570.55	
-	2717.33	1576.64	
-	2772.53	1483.59	
-	2770.73	1356.54	
-	2786.68	1338.7	
-	2824.25	1350.47	
-	2866.72	1329.11	
-	2896.16	1243.66	
-	2888.14	1125.91	
-	2923.34	1077.52	
-	2956.56	955.85	
-	2996.48	884.09	
-	3106	804.81	
-	3159.44	791.41	
-	3258.78	824.31	
-	3300.04	766.56	
-	3308.9	780.48	
-	3309.72	645.39	
-	3211.17	593.27	
-	3183.95	552.44	
-	3192.45	512.32	
-	3233.64	466.61	
-	3233.39	431.04	
-	3247.93	445.2	
-	3306.57	429.55	
-	3296.6	456.5	

1089

-	3314.19	464.32		
-	3272.53	524.22		
-	3289.52	507.2		
-	3327.76	570.78		
-	3426.14	650.88		
-	3459.02	713.82		
-	3478.57	818.24		
-	3469.96	930.75		
-	3492.7	1027.54		
-	3535.9	1105.11		
-	3512.35	1196.06		
-	3559.09	1259.78		
-	3574.64	1319.83		
-	3538.39	1332.32		
-	3522.64	1284.06		
-	3496.08	1276.34		
-	3342.46	1359.41		
-	3308.89	1402.24		
-	3363.1	1549.61		
-	3364.78	1632.65		
-	3417.19	1713.09		
-	3405.82	1831.54		
-	3506.53	1944.13		
-	3567.49	2087.38		
-	3675.23	2146.6		
-	3699.02	2212.77		
-	3727.21	1934.65		
-	3742.56	1957.08		
-	3753.32	1942.74		
-	3763.88	2097.35		
-	3802.63	1954.75		
-	3811.73	1981.13		
-	3823.85	1964		
-	3805.88	2268.86		
-	3887.74	2241.66		
-	3899.55	2191.91		
-	3951.71	2185.71		
-	4028.1	2103.3		
-	4037.71	2028.61		
-	4100.34	1975.64		
-	4136.68	1889.99		
-	4108.07	1849.28		
-	4152.96	1821.6		
-	4224.07	1612.55		
-	4299.42	1518.06		
-	4341.39	1399.19		
-	4438.56	1271.46		
-	4485.41	1173.86		
-	4491.51	94.57	183	
-	4491.51	79.63		
-	4473.22	2998.58	183	
-	4431.61	2980.04		
-	4390.07	2913.96		
-	4202.89	2907.86		
-	4159.14	2935.69		
-	4104.34	3020.73		
-	4321.04	3023.78	183	
-	4378.05	2984.28		
-	4417.29	2991.32		
-	4439.62	3023.78		
-	1000.84	4502.06	203	
-	954.84	4439.32		
-	960.21	4413.69		
-	991.32	4408.65		
-	1061.56	4486.92		
-	1075.41	4456.85		
-	1026.49	4400.39		
-	1068.37	4386.16		
-	1036.16	4363.81		
-	1041.26	4335.29		
-	1008.27	4260.53		
-	961.91	4233.87		
-	906.99	4243.27		
-	915.7	4317.14		
-	892.65	4324.26		
-	888.74	4354.41		
-	822.78	4327.26		
-	776.27	4159.86		
-	749.64	3861.98		
-	815.66	3822.36		
-	778.52	3827.98		
-	778.04	3810.67		
-	819.16	3804.57		
-	910.08	3857.41		
-	940.68	3852.52		
-	949.03	3813.37		
-	959.1	3867.85		
-	1010.69	3904.69		
-	991.39	3820.65		
-	1022.9	3777.99		
-	1050.36	3788.82		
-	1044.76	3740.2		
-	1107.14	3750.28		
-	1100.79	3779.66		
-	1080.47	3767.72		
-	1065.77	3791.68		
-	1128.82	3847.37		
-	1168.94	3842.08		
-	1192.99	3736.75		
-	1223.21	3734.98		
-	1242.64	3674.62		
-	1309.49	3611.09		
-	1245.85	3530.27		
-	1266.82	3514.23		
-	1265.72	3457.1		
-	1349.42	3503.21		
-	1418.05	3482.05		
-	1430.86	3532.15		
-	1418.05	3591.78		
-	1479.68	3629.64		
-	1516.72	3669.66		
-	1504.93	3635.44		
-	1532.42	3633.49		
-	1532.37	3565.33		
-	1562.81	3528.73		
-	1506.47	3473.16		
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-	2562.34	1094.28		
-	2499.39	1249.18		
-	2484.78	1264.12		
-	2471.18	1245.98		
-	2513.44	1166.37		
-	2498.61	1139.3		
-	2517.47	1079.9		
-	2547.95	1012.85		
-	2568.26	1008.49		
-	2571.74	928.96		
-	2626.05	841.04		
-	2636.66	749.58		
-	2568.32	567.09		
-	2544.34	558.63		
-	2574.31	552.61		
-	2598.75	578.76		
-	2562.19	329.3		
-	2549.82	352.74		
-	2561.68	402.68		
-	2510.3	246.63		
-	2552.83	460.64		
-	2538.28	475.19		
-	2501.66	424.52		
-	2516.46	396.37		
-	2501.09	390.22		
-	2488.99	409.97		
-	2462.01	351.35		
-	2491.94	310.68		
-	2488.76	286.33		
-	2374.49	170.51		
-	2361.46	131.91		
-	2365.07	98.45		
-	2440.64	84.52		
-	2443.32	5.37		
-	2470.66	48.69		
-	2427.84	134.27		
-	2416.05	140.13		
-	2415.84	114.28		
-	2359.68	179.73		
-	2352.67	250.18		
-	2294.13	240.72		
-	2275.14	145.94		
-	2233.53	78.81		
-	2187.78	117.94		
-	2214.74	137.34		
-	2192.48	214.73		
-	2223.56	222.89		
-	2284.93	319.48		
-	2260.09	381.21		
-	2210.7	372.6		

-	2588.47	-1592.87			
-	2608.04	-1551.5			
-	2664.66	-1541.04			
-	2671.81	-1508.83			
-	2719.55	-1461.82			
-	2870.27	-1079.05			
-	2924.33	-1190.61			
-	2967.53	-1232.93			
-	2978.36	-1225.03			
-	3028.57	-1238.28			
-	3010.68	-1284.06			
-	3043.74	-1319.6			
-	2989.34	-1468.48			
-	3001.11	-1502.5			
-	2974.1	-1547.73			
-	2978	-1593.93			
-	3009.11	-1626.41			
-	3089.42	-1535.99			
-	3086.47	-1577.84			
-	3056.97	-1598.07			
-	3053.32	-1625.42			
-	3102.45	-1596.83			
-	3113.79	-1615.26			
-	3110.53	-1663.85			
-	3065.4	-1692.37			
-	3068.64	-1737.92			
-	2980.58	-1831.76			
-	3004.18	-1838.05			
-	2986.4	-1896.42			
-	2954.04	-1903.47			
-	2996.37	-2037.32			
-	2983.03	-2071.94			
-	3005.12	-2099.61			
-	2977.09	-2114.81			
-	2991.66	-2127.12			
-	2931.99	-2107.08			
-	2871.04	-2146.71			
-	2885.31	-2169.16			
-	2863.66	-2194.16			
-	2682.06	-2271.67			
-	2571.78	-2488.93			
-	2693.38	-2331.79			
-	2717.29	-2319.26			
-	2702.83	-2331.07			
-	2716.75	-2337.38			
-	2878.19	-2255.49			
-	2929.91	-2273.28			
-	2943.12	-2345.21			
-	3009.23	-2328.42			
-	3098.19	-2371.89			
-	3179.82	-2373.85			
-	3205.75	-2404.22			

1091

-	1577.75	-399.26		
-	1629.5	-403.91		
-	1641.72	-386.08		
-	1601.5	-292.95		
-	1632.47	-322.98		
-	1649.77	-307.19		
-	1692.44	-376.96		
-	1714.78	-360.58		
-	1721.15	-383.95		
-	1769.62	-411.26		
-	1822.52	-354.48		
-	1866.97	-341.04		
-	1876.11	-301.57		
-	1845.63	-219.28		
-	1818.55	-209.61		
-	1857.98	-79.35		
-	1847.98	-56.56		
-	1952.64	88.44		
-	1983.2	104.87		
-	2059.95	102.93		
-	2084.48	184.91		
-	2114.78	207.88		
-	2104.29	223.18		
-	2018.8	167.94		
-	2071.48	360.69		
-	2074.22	390.61		
-	2058.81	391.24		
-	2076.07	565.48		
-	2126.73	785.66		
-	2093.72	1141.75		
-	2109.3	1211.89		
-	2081.25	1323.1		
-	1999.58	1447.98		
-	1988.56	1510.19		
-	1951.69	1564.78		
-	1831.14	1681.37		
-	1668.75	1883.91		
-	1588.46	1918.48		
-	1553.25	1909.56		
-	1507.51	1987.5		
-	1467.52	2006.67		
-	1379.24	2116.28		
-	1340.18	2136.77		
-	1309.46	2117.23		
-	1220.17	2345.08		
-	1184.73	2377.38		
-	1163.63	2365.55		
-	1115.19	2380.74		
-	964.66	2140.27		
-	955.6	2009.6		
-	875.44	1825.84		
-	854.25	1709.91		
-	865.8	1601.97		
-	832.95	1418.75		
-	850.45	1399.32		
-	837.26	1361.05		
-	881.13	1332.33		
-	807.23	1326.28		
-	788.14	1304.46		
-	803.28	1279.78		
-	791.13	1223.35		
-	830.71	1121.28		
-	831.03	835.01		
-	860.73	802.74		
-	869.4	729.71		
-	736.4	906.72		
-	705.99	997.45		
-	694.1	1253.08		
-	653.47	1292.42		
-	645.29	1401.18		
-	576.54	1568.25		
-	580.04	1722.02		
-	606.56	1743.4		
-	619.07	1816.75		
-	570.9	1880.47		
-	592.59	1966.86		
-	626.27	2003.53		
-	623.31	2122.64		
-	581.55	2221.18		
-	572.22	2300.3		
-	543.89	2320.82		
-	541.15	2360.56		
-	496.04	2382.9		
-	495.62	2535.18		
-	453.4	2635.68		
-	477.33	2664.11		
-	457.99	2665.41		
-	465.19	2721.08		
-	432.03	2751.7		
-	437.46	2792.15		
-	381.79	2774.35		
-	334.18	2820.11		
-	443.61	2842.4		
-	445.87	2890.9		
-	477.32	2907.97		
-	469.17	2934.1		
-	513.63	2963.05		
-	499.12	3005.99		
-	535.29	3106.93		
-	529.97	3133.6		
-	512.15	3093.91		
-	526.11	3188.09		
-	461.74	3255.52		
-	399.65	3270.97		
-	342.87	3350		
-	303.86	3361.88		
-	262.2	3348.62		
-	209.56	3370.25		
-	236.33	3371.39		
-	248.78	3393.44		
-	228.13	3412.92		
-	254.88	3442.22		
-	237.18	3471.69		
-	285.83	3458.87		
-	324.57	3398.72		
-	382.84	3386.73		
-	428.02	3413.42		
-	467.27	3398.6		
-	480.42	3414.78		
-	489.57	3458.7		
-	475.86	3474.62		
-	367.43	3470.52		
-	355.52	3492.47		
-	440.47	3526.66		
-	428.8	3681.32		
-	478.23	3760.17		
-	475.08	3791.88		
-	492.52	3788.79		
-	565.43	3886.32		
-	583.32	3981.88		
-	625.35	4038.65		
-	620.68	4153.9		
-	651.11	4237.74		
-	629.84	4283.15		
-	635.93	4394.68		
-	661.6	4444.23		
-	641.8	4471.35		
-	617.52	4442.44		
-	596.38	4502.06	223	
-	2702.26	4514.25		
-	2725.63	4490.95		
-	2659.88	4514.25	203	
-	2580.34	4514.25		
-	2571.49	4514.25	203	
-	2232.86	4511.21		
-	2208.77	4511.21	203	
-	3108.71	2044.54		
-	2990.41	2089.45		
-	2939.91	1992.71		
-	2939.98	1933.54		
-	2965.5	1901.72		
-	3024.56	1895.93		
-	3090.09	1947.06		
-	3104.04	1997.14		
-	3141.35	1981.36	203	
-	2721.92	2184.5		
-	2695.05	2152.98		
-	2573.05	2150.08		
-	2531.04	2115.12		
-	2565.15	2078.93		
-	2657.61	2130.21		
-	2822.41	2056.94		
-	2864.59	2060		
-	2863.87	2084.96		
-	2827.3	2103.93	203	
-	2208.48	4511.21		
-	2177.98	4492.05		
-	2200.76	4456.59		
-	2278.66	4470.49		
-	2269.66	4446.9		
-	2294.2	4419.68		
-	2358.85	4395.28		
-	2370.12	4406.22		
-	2492.3	4329.17		
-	2589.53	4381.85		
-	2588.68	4292.89		
-	2647.36	4248.41		
-	2679.14	4248.17		
-	2709.42	4275.23		
-	2747.84	4392.35		
-	2580.63	4514.25	203	
-	2425.11	2088.58		
-	2427.16	2176.15		
-	2384.67	2235.4		
-	2275.72	2326.46		
-	2242.75	2317.08		
-	2284.82	2199.58		
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-	2442.94	2036.45		
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-	-4503.16	-1197	

*** Configuration ***
Heights for all calculation results are absolute
0.7G Ground Factor
20.0Â°C Temperature
70% Humidity
Results are A-weighted
Results are rounded to 0 decimal places
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Following ISO17534-3 recommendation 5.2
Ground reflections are screened (original ISO9613-2 method)

*** Key ***

Lw	Sound Power Level (dB)
Ad	Distance attenuation aka geometrical divergence" ISO9613-2 (dB)"
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

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6th NIPA

SIXTH NOTICE OF INCOMPLETE PERMIT APPLICATION
APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: commercial use – munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Dear Matthew Norfolk:

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on July 10, 2025.

The following clarification is necessary to review the application:

- Please identify any solvents, lubricants, coatings, etc. that are applied to the inside or outside of the 155mm howitzer barrel assembly and/or used in the testing process. Please describe the process and location for application of any of these products, including any details related to transportation into and/or out of the proposed site, storage, and/or disposal. Please identify the products proposed to be used and their chemical composition, including but not limited to product labels, material safety data sheets, or other information sufficient to identify the chemical compounds being applied, transported, stored, and/or disposed of as part of the proposed project.

You will receive a notice in writing informing you when staff has received the information necessary to complete the application. At the time the application is deemed complete, the required time period for Agency action on your proposed project will begin.

The proposal may not be undertaken until a permit has been issued by the Agency. "Undertake" means any commencement of a material disturbance of land preparatory to the proposed project, including but not limited to road construction, grading, installation of utilities, excavation, clearing of building sites, or other landscaping, or in the case of subdivision, the conveyance of any lots.

If you have any questions regarding this Notice or the project review process, please contact APA Environmental Program Specialist 1 (EPS1) **Fritz Aldinger** who is assigned to review your project.

July 25, 2025
Date

John M. Burth
Deputy Director, Regulatory Programs

6th NIPA and Responses

New York State
Adirondack
Park Agency

KATHY HOCHUL
Governor

BARBARA RICE
Executive Director

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency

RECEIVED

Date: September 11, 2025

SIXTH NOTICE OF INCOMPLETE PERMIT APPLICATION

APA Project No. 2021-0276

Project Sponsor:	**Authorized Representative:**
Michael Hopmeier 620 Herndon Parkway, Suite 120A Herndon, VA 20170	Matthew D. Norfolk, Esq. 1936 Saranac Ave, Suite 106 Lake Placid, NY 12946

Date Permit Application Received: November 19, 2021
Type of Project: Commercial Use – Munitions testing facility
Location of Project: Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

Thank you for the recent submission in relation to APA Project No. 2021-0276, received by the Agency on July 10, 2025.

The following clarification is necessary to review the application:

- Please identify any solvents, lubricants, coatings, etc. that are applied to the inside or outside of the 155mm howitzer barrel assembly and/or used in the testing process. Please describe the process and location for application of any of these products, including any details related to transportation into and/or out of the proposed site, storage, and/or disposal. Please identify the products proposed to be used and their chemical composition, including but not limited to product labels, material safety data sheets, or other information sufficient to identify the chemical compounds being applied, transported, stored, and/or disposed of as part of the proposed project.

Response: The Applicant objects to this latest request as it is in violation of Executive Law §809(b). The Agency is prohibited to issue multiple notices of incomplete application and request the Applicant to supplement its application unless there is a change in the application or the proposed project or information was received by the Agency that gives cause for a notice of incomplete application and the request(s) therein. Here, the application, as supplemented by the Applicant with its responses to the five previous notices of incomplete permit application, provides all the information required by statute and the Agency previously. The Agency was required to request information about any products applied to the barrel of the subject howitzer with its first notice of incomplete application. There has been no change in the application or the proposed project nor new information provided since the submission of the application to give the Agency

cause to now seek, nearly four years later, information about products Agency Staff speculates are applied to the barrel. The Agency is abusing its discretion, in violation of the Adirondack Park Agency Act (Executive Law, Article 27), with its random, endless requests for information and clarification.

Notwithstanding the foregoing and without waiving the Applicant's objection expressed above, there are no solvents, lubricants, coatings or other products that are applied to the inside or outside of the howitzer barrel nor used in the testing procedure. As a consequence, there are no such products transported in or out of the proposed site nor stored or disposed of on the proposed site. The barrel does not require cleaning given the minimal use or limited number of shots required for testing. As stated in previous submissions, there will be 30 shots per year for five years resulting in 7,500 milliseconds of impulse sound over the life of the proposed project.

Norfolk Beier PLLC

By: _____

Project Sponsor's Final Comments

NEW YORK STATE OF OPPORTUNITY. Adirondack Park Agency
RECEIVED
Date: November 6, 2025

PROJECT SPONSOR'S FINAL COMMENTS

November 6, 2025

APA Project No. 2021-0276
Applicant: Unconventional Concepts, Inc. (UCI)
Project Sponsor: Michael Hopmeier
Type of Project – Ballistic Testing Range
Town of Lewis, Essex County
Land Use Area: Rural Use
Tax Map No.: 38.1-1-31.000 & 38.1-1-29.000

I will not waste the Board's time by rehashing the voluminous quantity of information submitted through the application process. However, I feel a few key facts should be brought to the Board's attention. Therefore, I wish to add the following comments to the official record for the above-referenced application.

- At its heart, UCI's proposal is no more, or less, than a request to use firearms in the park.

- The Board recently approved an application to expand mining at a site one mile away from the proposed test area. This mining operation has the express purpose to destroy small parts of the park, using high explosives in quantities 100 times greater than the proposal under discussion, and generating concomitant levels of noise and shock. That operation's location is closer to more sensitive areas of the Park than UCI's proposed test site. UCI supports their operation. However, we do not understand how it can be acceptable to destroy parts of the Park, but unacceptable to use firearms in the Park.

- The duration of *all* noise generated by the proposed project has been calculated to be a total of *7 seconds over a 5-year period*. The noise at the closest residence to the proposed test site will be less than that of a firearm, Harley Davison motorcycle, chainsaw, or heavy truck, and of much shorter duration.

- The number of shots fired during one year of the proposed project will be lower than the number of shots fired in the last 2 days in and around the same property by hunters, and lower than the number of blasts in the last month conducted by the mine.

- The goal of the proposed testing is to enhance the public good by improving national security. Unlike resource extraction, the proposed project is not merely for profit.

- Despite protestations of UCI's proposal, many local citizens also engage in blasting. They use Tannerite, a binary explosive with approximately half the explosive power of TNT. It is regularly used in the area for sport shooting,

destroying beaver dams, and basic civil engineering such as clearing trees and rock. The noise from Tannerite does not appear to bother local citizens.

With regard to the public comments submitted, I observed the following:

- Many of the comments provided no thoughtful input, revealed no critical information, were unrelated to reality, were based on demonstrably false information, or were form submissions designed to provide quantitative, but not qualitative, input.

- A significant number of the comments provided were from people who live far outside the local area, would be unaffected by the proposed project, and, thus, have no interest in the issue except perhaps to gain a brief period of notoriety and be part of a group.

- Statements related to the use of helicopters, drones, and low-flying F-35s were factually incorrect, technically impossible, and unrelated to the proposed project.

- While UCI has offered numerous opportunities for commenters to request factual, firsthand knowledge of the project and its effects, UCI has received no such requests.

UCI has been, and remains, an exemplary steward of the land and environment. We have spent significant time and many hundreds of thousands of dollars cleaning up the property; for example, we removed more than one hundred tons of garbage from the site that was illegally dumped by other citizens of the Park. We have also gone well beyond the community's baseline efforts to maintain forest health, from repairing and continually maintaining the logging roads to help suppress forest fires, to engaging in managed forest husbandry to encourage a healthy and sustainable woodland. When the APA was unable and unwilling to provide information on forest management and land maintenance for the Park, we went elsewhere to learn beneficial practices to apply, making us a model for conservation.

One final note involves the APA process itself. The APA's mission is clear:

The mission of the APA is to protect the public and private resources of the Adirondack Park through the exercise of the powers and duties provided by law.

This mission is laudable and UCI fully supports it. However, the APA fails in the application of its mission. Observed deficiencies range from being unable to answer simple questions about forest health and maintenance, to admitting a complete lack of scientific and technical knowledge relating to UCI's application, and a refusal to obtain that necessary knowledge. The process applied by the APA is woefully lacking in competence and ability. Thus, the APA is failing in its mission to protect the Park. Again, UCI fully supports the APA's mission. However, its implementation of its mission should be heavily reviewed and revised.

Lastly, based on questions related to the project application and the stated official position of the APA as elucidated by its staff, political expediency and personal inclination against the military will override the APA's mission and the regulations by which they are governed. If the proposal were to blast holes in the mountains and clear-cut the forest, it is apparent that the APA would accept it, as it has. However, supporting the men and women who work to preserve our freedoms and defend our rights through an environmentally friendly program is clearly not acceptable.

This state of affairs deeply saddens us, but it is what we must deal with. We only hope the APA will follow its mission and mandate, and not be subsumed by special interests and lack of foresight and courage.

Respectfully,

Michael Hopmeier
Unconventional Concepts, Inc.
Town of Lewis, New York