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April 2, 2020

RE Sound Review - 287 Ocean House Road, Cape Elizabeth

Dear Brandon,

Bodwell EnviroAcoustics, LLC (BEA) has reviewed the proposed site and building plans to convert a vacant building at 287 Ocean House Road, Cape Elizabeth to a retail lumber store, with a business office, workshop and class space. The objective of this review is to assess sound levels expected from equipment associated with the lumber supply and workshop operations based on the building design and considerations for controlling noise. For this review, BEA calculated sound level estimates from lumber supply/workshop equipment to evaluate compliance with Town of Cape Elizabeth sound limits contained in the current Zoning Ordinance.

### **Site Description**

The proposed lumber store and workshop will be housed inside a vacant building located on a 0.93 acre property at the corner of Ocean House Road (Route 77) and Scott Dyer Road, with the majority of frontage on Ocean House Road. The proposed site design features vehicular access from both public roads and parking areas distributed across the site. There is also an outdoor storage area in the northwest corner of the parking area. Two properties abut the site to the west and their existing uses include a two-story barn and a two-story dwelling further from Scott Dyer Road. The area is zoned Town Center per the Town of Cape Elizabeth Zoning Map and Ordinance which allows a mix of commercial and residential uses. The proposed site plan and adjacent uses are shown as Figure 1.

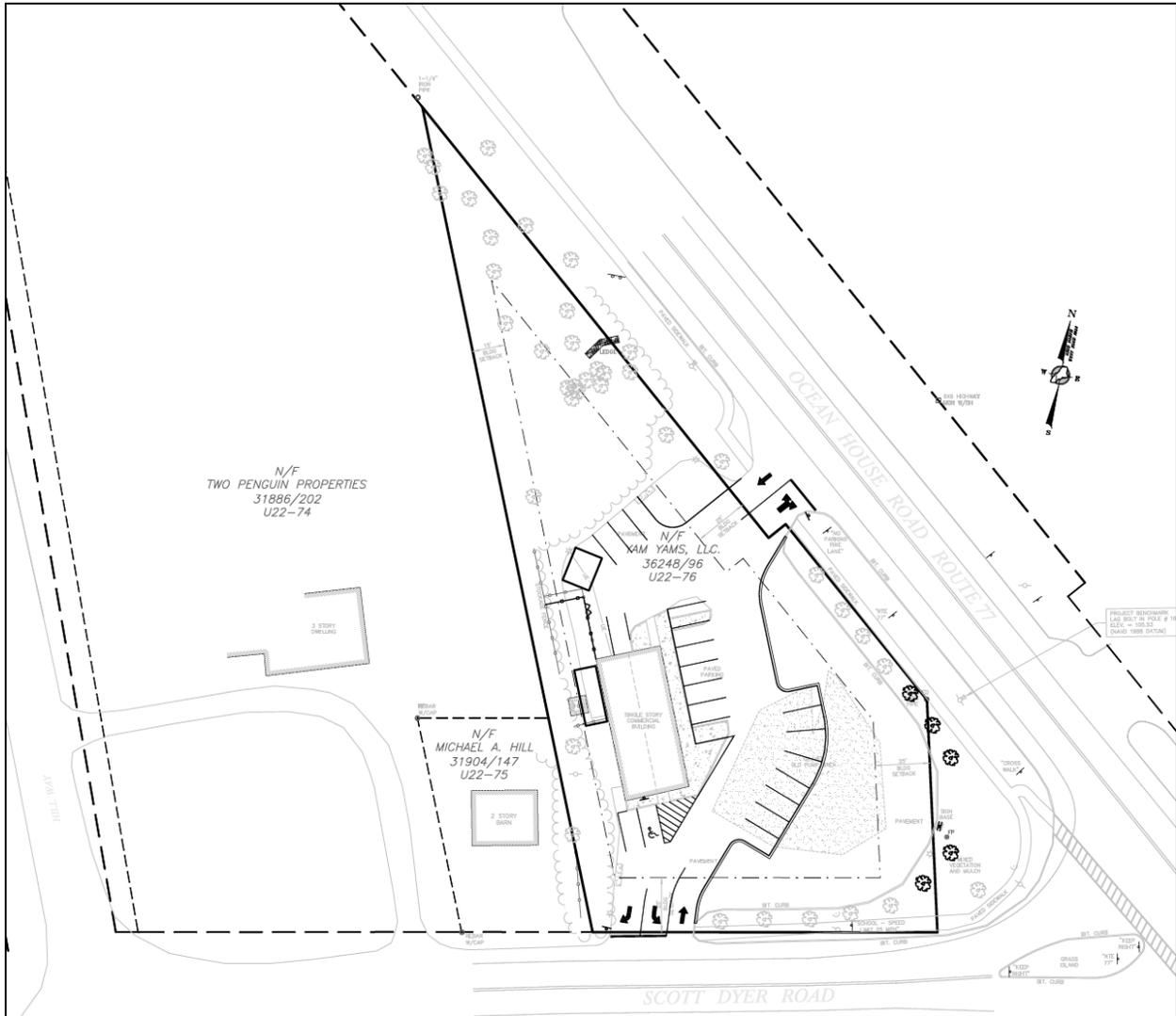


Figure 1. Proposed Site Plan

### Proposed Operation and Equipment

The proposed lumber store and workshop will include material delivery, storage and sales, and woodworking classes with the north end of the existing building be converted into a workshop with various types of power saws, a wood planer, and a dust collector. The planned operating hours are:

Retail Sales/office: Monday thru Saturday 7 am to 6 pm

Sunday: 8 am to 2 pm

Classes will be from 6 pm to 9 pm

The planned workshop equipment includes:

- Panel Saw for cutting up to 4 ft by 8 ft sheets of plywood and composite board
- 12-inch Wood Planer
- 10-inch Compound Miter Saw
- 10-inch Portable Table Saw

The proposed dust collector is wall-mounted and rated at 1,250 CFM (cubic feet per minute) and discharges through a filter bag inside the building.

The workshop will be enclosed in a separate room accessed from inside the store by a 3-foot high stairway and interior access door with no exterior door or direct openings to the outside. The three exterior workshop walls consist of existing exposed concrete block inside to a height of approximately 7 feet and exterior siding of hemlock shiplap. The upper gable end walls and ceiling/roof are standard wood-framed construction with fiberglass batt insulation and painted sheetrock. A double-paned, insulated window will be installed in an existing opening near the top of the north exterior wall. The interior wall (toward the store) will be 2 x 6" wood framing with sheetrock or wood panel walls, which may also have interior windows, and the workshop floor of the elevated area will be wood. The proposed floor plan showing the workshop area is presented as Attachment 1.

Workshop activity will consist of a single power saw or planer operating along with the dust collector. Product information was provided that indicates the dust collector generates a sound level of 78 dB(A) at 3 meters and the planer is rated at 83 dB(A) at the operator. No sound ratings were included in the product descriptions for the power saws but several sources were found that indicate the highest sound levels are likely to be generated by the miter saw and can range up to 105 dB(A) at 1 meter. Exterior operations associated with the lumber store will consist of a small fork truck for unloading lumber and materials.

### **Noise Standards**

BEA understands that the proposed facility is subject to the Town of Cape Elizabeth Zoning Ordinance (Chapter 19) and requires Planning Board approval and that approval by the Maine Department of Environmental Protection (DEP) under the Site Location of Development Act is not required. The Town has established noise standards that are applicable to the facility as set forth in 11. Noise of Section 19-9-5 Approval Standards of Article IX SITE PLAN REVIEW as follows:

The maximum permissible A-weighted decibel level of a continuous, regular or frequent or intermittent source of sound produced by unique activities, structures or equipment on the site shall be limited by the time period and by the abutting land use as listed below. Sound levels shall apply at least four (4) feet above ground at the property boundary of the source. Existing background sounds are excluded from the decibel measurement and noise generated by construction of the site is exempt. (Effective November 5, 2016)

Sound Pressure Level Limits Using the A-weighted decibel level (dBA)

Abutting Use	7 a.m. - 10 p.m.	10 p.m. - 7 a.m.
Residential	55	45
Residential located in a commercial- Industrial district	65	55
Public, semipublic and institutional	60	55
Vacant or rural	60	55
Commercial	65	55
Industrial	70	60

(Effective November 5, 2016)

From this, the applicable sound limit is for a Residential [Use] located in the Town Center commercial district which is 65 dBA between 7 am to 10 pm (day/evening) and 55 dBA from 10 pm to 7 am (nighttime) when measured at the property line of 287 Ocean House.

### Estimated Sound Levels

BEA prepared sound level estimates for the lumber store/workshop activity at the facility property line for the abutting properties to the west based on the power equipment with the expected highest range of sound output.

For the indoor workshop operation, the resulting sound level at this property line is determined from the estimated sound levels along the interior and exterior surfaces of the building. The interior sound level results from both the direct and reflected sound paths is calculated based on the estimated equipment sound level, the distance from the source (power saw) to the interior wall, and the amount of sound absorption provided by interior surfaces of the workshop. From this, the exterior sound levels from the building surfaces are calculated by subtracting the sound transmission loss of the sound passing through the walls and roof. These exterior walls and roof become area sound sources and the sound propagation resulting at the property line is based on the outdoor sound level at the building and the total surface area oriented toward the property line.

The concrete block walls provide both relatively high sound absorption and transmission loss, whereas the other interior surfaces (sheet rock and windows) are sound reflectors with the potential for slightly lower transmission loss. Transmission loss is the reduction in the interior sound level as sound passes through the wall or ceiling to the outdoors. The mean sound absorption of the interior surfaces of the workshop is estimated to be 0.05 with a mean transmission loss 39 dBA. The total interior surface area of the ceiling, walls and floor of the workshop is approximately 145 m<sup>2</sup>, yielding total sound absorption of 7 m<sup>2</sup> Sabins. From this, with the equipment source approximately 12 feet (3.7 m) from the exterior wall, as shown by the graph below, there is 5 dB sound level reduction of the rated sound power level at the interior wall surface. As previously noted, the estimated highest range of sound level from the miter saw is 105 dBA at 1 meter, this equates to a sound power level of 113 dBA for this source<sup>1</sup>. With a 5 dB

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<sup>1</sup> *Sound Power Level* is an industry standard acoustic term to represent the rated sound level of a sound source, similar to power output of amplified speakers, while the *Sound Pressure Level* represents the measured sound level at a specified distance from a sound source similar to amplitude or volume.

reduction, the net sound level along the interior of the west wall is estimated to be 108 dBA during wood cutting. Applying the estimated transmission loss of 39 dB and 6 dB for interior to exterior sound propagation, yields a sound level of 63 dBA. The total surface area of the walls and rooftop facing toward the abutting property is approximately 55 m<sup>2</sup>.

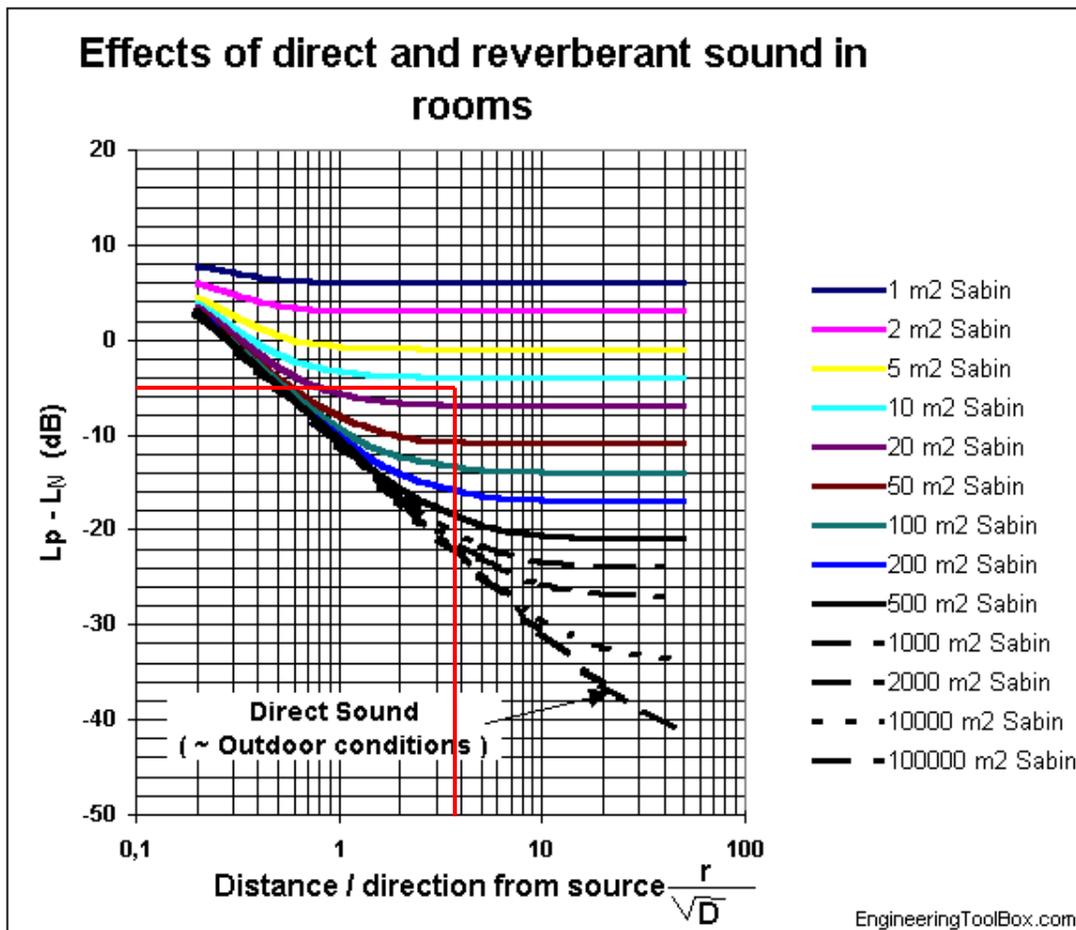
From this, the resulting sound power level of the workshop is determined from:

$L_w = \text{Exterior SPL} + 10 \times \text{Log } S$ , where S is the total Surface Area toward the property line

$$L_w = 63 \text{ dBA} + 10 \times \text{Log } (55)$$

$$L_w = 81.4 \text{ dBA}$$

At the closest distance of 25 feet from the workshop to the property line, attenuation to sound divergence is 26 dBA, yielding an estimated sound level of 55.4 dBA at the property line from the loudest equipment in the workshop. The rated sound level from the dust collector results in this being a minor exterior sound source and would not contribute to the highest sound level at the property line.



Interior sound levels from operation of power saws and tools can be reduced by installing sound absorbing panels on the interior surfaces of the workshop, which would also reduce exterior sound levels near the building and nearby property line.

Based on the site plan, exterior operation of the fork lift may be as close to 25 feet to the west property line. To meet the Town sound limit of 65 dBA, a fork lift with this sound rating should be used. Electric fork lifts are quieter and could be an option if needed.

### Summary

The results of this sound review indicate that the highest expected sound levels from equipment associated with proposed daytime operation of the lumber store and workshop will be approximately 10 dBA below the applicable sound limits set forth by the Town of Cape Elizabeth Zoning Ordinance. Sound levels from occasional outdoor use of the fork lift may approach the 65 dBA limit for brief periods when operating 25 feet from the property line.

Please do not hesitate to contact me should you have any questions or need additional information concerning any aspect of this Sound Review.

Respectfully,



R. Scott Bodwell, P.E.  
Principal

Attachment

Attachment 1. Proposed Floor Plan with Workshop Layout

