Ref 8179- 404.3 - Woolworths Tuncurry Supplementary Acoustic Report

23-May-11

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Attention Joe Harber

Dear Joe

Subject:-Woolworth Tuncurry Supplementary Acoustic Report.

Introduction

Hunter Acoustics has been asked to review the options for further reducing noise impacts associated with the use of the loading dock at the proposed Woolworths supermarket at Manning Lane Tuncurry. This supplementary report considers additional and amended acoustic treatments that may be applied to the loading dock.

The aspects of noise emissions from the dock that are considered in this supplementary report are the:-

- Reduction of the noise impacts of trucks entering and leaving the dock,
- Reduction of noise impacts of truck activities within the dock area when the roller doors are open,
- Reduction of noise impacts associated with the ventilation of the loading dock area.

It is important to recognise and appreciate the context within which this work has been conducted. The original acoustic report from Hunter Acoustics Report No 8179-401.2, and subsequent correspondence, has demonstrated that the proposed development with the operations proposed in the revised Transport Delivery Management Plan will comply with the Project Specific Noise Goals which have been set in accordance with the Industrial Noise Policy and the Local Government Noise Guide.

The project specific noise goals (Target Noise Goals) are set in terms of a 15 minute equivalent continuous noise level, which is expressed as the parameter $L_{Aeq15min}$. The 15 minute equivalent continuous noise level is a measurement of average acoustic energy level and can be understood to be an average noise level over a 15 minute sample period that is weighted towards the higher noise levels measured over the sample period. The weighted average concept automatically implies that within any sample period there will be sound levels at the receiving point that are both above and below the target average level. Because the measurement and assessment process is both time and energy based a short term high noise level contributes more to the measured result than a longer term lower noise level.

It is sometimes the case that short term high noise levels may be found annoying by nearby residences if they are constantly repetitive, or are at levels that disturb comfort or repose or interrupt activities such as conversation, telephone use or listening to music or television. Sounds that have the potential to cause this type of disruption would normally be captured by the weighted average assessment, however, in this case a more detailed examination of the short term noise levels has been sought.

This supplementary report evaluates the effects of additional acoustic treatments that may be provided for the proposed development to control short term sound levels that are above the project specific noise goals. The sounds that are evaluated in this report are particularly the short term sounds from heavy vehicle operations associated with the dock area.

Smaller trucks, vans and utes used for direct delivery as noted under Section 2.2 of the revised Transport and Delivery Management Plan have not been considered as part of this supplementary report because the noise emissions from these delivery vehicles are low and are consistent with normally daily traffic as it currently exists. Once inside they have entered the dock smaller vehicles need not manoeuvre outside the dock enclosure and their sound emissions will be adequately dissipated within the dock area by the absorptive material fitted to the dock roof and walls. Care will still be required if Woolworth's personnel handle potentially noisy materials, such as crated bottles, in the dock area outside the stock room but this type of activity has previously been assessed in our earlier report and found to be acceptable.

Methodology

The options considered have been modelled using CadnaA to calculate external sound propagation from the dock to residences and account for the effect of proposed additional noise control barriers and by using proprietary spreadsheet models to determine internal sound propagation within the dock areas.

The operational information used in developing this supplementary assessment has been derived from a number of sources including the revised Transport and Delivery Management Plan.

The options examined for control of noise from trucking movements and the operations of the loading dock to residences at "Mountview" were:-

a) No additional Treatments

b) The construction of an acoustic barrier 4.5 metres high at the boundary following the line of the proposed landscaping and extending a distance of approximately 16 meters from the eastern end of the dock towards Manning Lane.

c) Provision of a roofed enclosure over the dock entry driveway extending a distance of 16 meters towards Manning Lane.

d) The construction of an acoustic barrier 4.5 metres high at the boundary and extending a distance of approximately 8 meters from the western end of the dock towards Peel Street

e) Provision of a roofed enclosure over the dock exit driveway extending a distance of 8 meters towards Peel Street,

f) Provision of additional acoustic attenuation material within the dock area to reduce the sound emissions from the dock area when the dock roller shutters are open.

g) Provision of alternative ventilation configurations for the dock exhaust fan,

Each of the options was examined in detail and the outcomes are documented in the results section below.

Results

In examining the results of this work it is important to recognise that it deals with short term sound levels that are often a normal part of an existing environment. The sound levels considered in this supplementary report should not be compared directly with the project target noise goal expressed as an $L_{Aeq\ 15min}$ but need to be considered in the context of the overall acoustic environment and having regard to the duration of the sounds under consideration and how often they occur.

Table 1 below sets out the expected sound levels with and without the proposed additional sound attenuation measures and provides additional information on how often these sound may occur and for what duration based on the information set out in the Transport Delivery Management Plan.

Table 1 East Upper Floor of Mountview – Maximum Sound Levels

		Sound Mitigation Treatment			Sound Events	
		A	B	C		
Noise Source		No Treatment	4.5m High Barrier East of Dock	Roof Enclosure East of Dock	Duration	Number per day
1	Heavy Vehicle entering dock	60	54	44	30 seconds	6
2	Refrigerated Vehicle in dock with refrigeration unit operating	53	48	41	20 minutes	6
3	Heavy Vehicle manoeuvring to reverse into dock	35	35	35	60 seconds	6

Table 2 East Lower Floor of Mountview – Maximum Sound Levels

		Sound Mitigation Treatment			Sound Events	
		A	B	C		
Noise Source		No Treatment	4.5m High Barrier East of Dock	Roof Enclosure East of Dock	Duration	Number per day
1	Heavy Vehicle entering dock	60	44	44	30 seconds	6
2	Refrigerated Vehicle in dock with refrigeration unit operating	53	42	40	20 minutes	6
3	Heavy Vehicle manoeuvring to reverse into dock	35	35	35	60 seconds	6

Table 3 West Upper Floor of Mountview – Maximum Sound Levels

		Sound Mitigation Treatment				Sound Events	
		A	A1	D	E		
Noise Source		No Treatment	Western Roller Door Closed	4.5 Meter High Barrier West of Dock	Roof Enclosure West of Dock	**Duration**	**Number per day**
1	Heavy Vehicle entering dock	<30	<30	<30	<30	30 seconds	6
2	Refrigerated Vehicle in dock with refrigeration unit operating	50	45	47	43	20 minutes	6
3	Heavy Vehicle manoeuvring to reverse into dock	58	n/a	50	44	60 seconds	6

Table 4 West Lower Floor of Mountview – Maximum Sound Levels

		Sound Mitigation Treatment				Sound Events	
		A	A1	D	E		
Noise Source		No Treatment	Western Roller Door Closed	4.5 Meter High Barrier West of Dock	Roof Enclosure West of Dock	**Duration**	**Number per day**
1	Heavy Vehicle entering dock	<30	<30	<30	<30	30 seconds	6
2	Refrigerated Vehicle in dock with refrigeration unit operating	51	45	42	42	20 minutes	6
3	Heavy Vehicle manoeuvring to reverse into dock	58	n/a	44	44	60 seconds	6

Table 5 20 Peel Street – Maximum Sound Levels

Noise Source		No Treatment	Western Roller Door Closed	**Duration**	**Number per day**
1	Refrigerated Vehicle in dock with refrigeration unit operating	50	42	20 min	6

Note None of the proposed additional treatments above will have any effect on the noise levels received at residences on the western side of Peel Street

Tables 1, 2 ,3, & 4 show that there is a beneficial reduction in maximum short term sound levels to the residence at Mountview by providing a 4.5 meters high wall along the boundary and a further reduction in maximum short term sound levels by providing an enclosed roof over the dock entry areas.

Interpretation of Results

The original assessment by Hunter Acoustics required that the roller shutters at each end of the dock be closed except to allow vehicle access. After the roller shutters are closed they adequately contain all sound within the dock area. The results of this analysis are interpreted in light of concerns expressed by the JRPP that excessive noise may result from trucks waiting in the dock entry areas while the roller shutter was opened or waited in the dock exit and manoeuvring area while the inner dock area was prepared to allow the truck dock access. All of the assessment and analysis in this supplementary report relates only to the operation of heavy vehicles, including garbage collection within the dock area.

When no vehicles are being unloaded within the dock area the stock area roller shutter will be closed and noise from activities within the stock room are adequately controlled by the roller shutter and walls associated with the stock room area. When a vehicle is in the dock and unloading operations are in progress the body of vehicle being unloaded provides adequate screening of sounds associated with unloading a vehicle to ensure that no excess sound reaches either 20 Peel Street or Mountview.

The follow operational options are considered as part of this overall review of noise levels associated with dock operations.

1. The eastern roller door for the dock is open at all times to allow immediate access to the enclosed dock area for any vehicle that arrives in the dock. Analysis was conducted for this condition to determine maximum noise levels associated with trucks entering the dock and operating within the dock.
    a. Un treated
    b. Treated by the construction of a 4.5 meter high barrier on the boundary extending approximately 16meters towards Manning Lane from the dock building.
    c. Treated by extending the dock building approximately 16meters towards Manning Lane from it currently proposed location.
2. The western roller door for the dock is open other than when noisy vehicles are operating in the dock. Analysis was conducted for this condition to determine maximum noise levels associated with trucks entering the dock and operating within the dock:-
    a. Un treated
    d. Treated by the construction of a 4.5 meter high barrier on the boundary extending approximately 8 meters towards Peel Street from the dock building.
    e. Treated by extending the dock building approximately 8 meters towards Peel Street from its currently proposed location.
    f. The operation of the dock with the western roller door closed while refrigeration and garbage vehicles operate in the dock area.

Short Term Heavy Vehicle Transit Sound Levels for Entering the Dock Area

Table 1 & 2 show a significant reduction in the short term pass by sound levels for the residences at the eastern end of Mountview for heavy articulated vehicles entering the dock though the open roller eastern roller shutter when a 4.5 meter high barrier is constructed along the boundary. A further reduction of the short term noise levels associated with vehicle passing through the dock entry area may be achieved by providing an enclosed roofed area over the dock entry driveway. Similar reductions would be apparent if the trucks are required to dwell in the dock for a period of time and only the duration of the sound is changed if the vehicle dwells in the dock entry for any period of time.

Similar reductions are apparent for vehicle transit noise levels at the western end of Mountview with the construction of either a 4.5 meter high barrier wall or an enclosed roofed space at the western end of the dock.

No reductions in short term transit sound levels are available at 20 Peel Street as a result of the proposed treatments for the entry and exit of the dock area.

Short to Medium Term Sound Levels Associated with Refrigeration and Garbage Collection Vehicles within the Dock.

Short to medium term sound levels within the dock area are associated with the operation of refrigeration units on refrigerated vehicles and the collection of garbage within the dock area. The dock area is configured such that when vehicles are located at the dock for unloading or when the garbage truck is emptying bins a substantially larger portion of the noise is directed to the western end of the dock as a result of the presence of the vehicle bodies and the layout of the dock. Provided an adequate amount of sound absorptive material is provided within the dock area the reflected sound from within the dock space remains substantially less at the eastern dock door than at the western dock door. The attenuation to the residences at the eastern end of Mountview may be further increased, either by providing a barrier between the residential building and the dock door opening or by extending the dock building and relocating the dock opening further to the east so the dock opening is east of the facade of the Mountview building. With either of these options it is possible to leave the eastern roller door open without compromising the sound emission levels to Mountview from within the dock. The results of this analysis are shown in Tables 1 and 2.

A similar logic can be applied to the western dock exit area and Tables 3 and 4 show the effects of the construction of a 4.5 meter high barrier or a roofed enclosure for a distance of 8 metres to the west of the currently proposed dock. Sound mitigation treatments to the west of the dock area are not able to have an effect on the noise emissions from the dock to 20 Peel Street because there is no way to place a barrier between the dock door and 20 Peel Street.

The only barrier that can be interposed between a noise source within the dock and 20 Peel Street is the western roller door. Whether or not a barrier or enclosure was constructed west of the dock the dock door would need to be closed when a refrigerated vehicle was being unloaded in the dock. If the western roller door is to be closed during noisy operations within the dock, then there is no real benefit to be derived by the provision of additional sound attenuation engineering structures to the west of the dock over and above the present proposal to shut the western roller door.

Table 5 shows the calculated short term noise levels at 20 Peel Street with the western roller door open and closed.

Overall Benefit and Preferred Options.

The overall acoustic benefit that is available due to additional sound attenuation structures may be summarised as follows.

Eastern End of Mountview Residential Building

a) For the upper floors at the eastern end of Mountview for 6 periods of approximately 20 to 30 seconds per day there will be a 5 dB(A) reduction using a barrier or a 8 dB(A) reduction using an enclosure for short term passby noise levels due to vehicles accessing the dock. Noise associated with vehicles waiting for dock entry will be substantially reduced.

b) For the lower floors at the eastern end of Mountview for 6 periods of approximately 20 to 30 seconds per day there will be a 10 dB(A) reduction using a barrier or a 12 dB(A) reduction using an enclosure in short term passby noise levels due to vehicles accessing the dock. Noise associated with vehicles waiting for dock entry will be eliminated.

c) Trucks transiting Manning Lane will remain at 56 to 58dB(A) at those residences for transit time past the residence.

d) The provision of either a barrier or an enclosure to the eastern end of the dock area will allow the eastern roller door to remain open at all times without excessive noise emissions from the internal area of the dock to the residence. For this aspect an enclosure is acoustically preferred as it provides better protection to the residences from the sound of the refrigeration equipment on trucks while in the dock area.

Western End of Mountview Residential Building

a) For the upper floors at the western end of Mountview for 6 periods of approximately 60 seconds per day there will be a 3 dB(A) reduction using a barrier or a 9 dB(A) reduction using an enclosure in short term manoeuvring noise levels due to vehicles accessing the dock.

b) For the lower floors at the eastern end of Mountview for 6 periods of approximately 60 seconds per day there will be a 7dB(A) reduction using a barrier or a 9 dB(A) reduction using an enclosure in short term manoeuvring noise levels due to vehicles accessing the dock.

It is necessary to be able to consider the overall acoustic benefits in the context of any disadvantages that may arise from the construction of additional structures. To enable such consideration I have endeavoured to set the resultant noise levels in the context of the existing environment. Figure 1 below shows the existing daytime sound level at the background logging location approximately midway between Peel Street and Manning Lane and adjacent to the Mountview building. The improvement in short term pass by noise levels from vehicles accessing the dock may be compared with the L_1 and L_{10} values from the daytime sound levels in Figure 1.

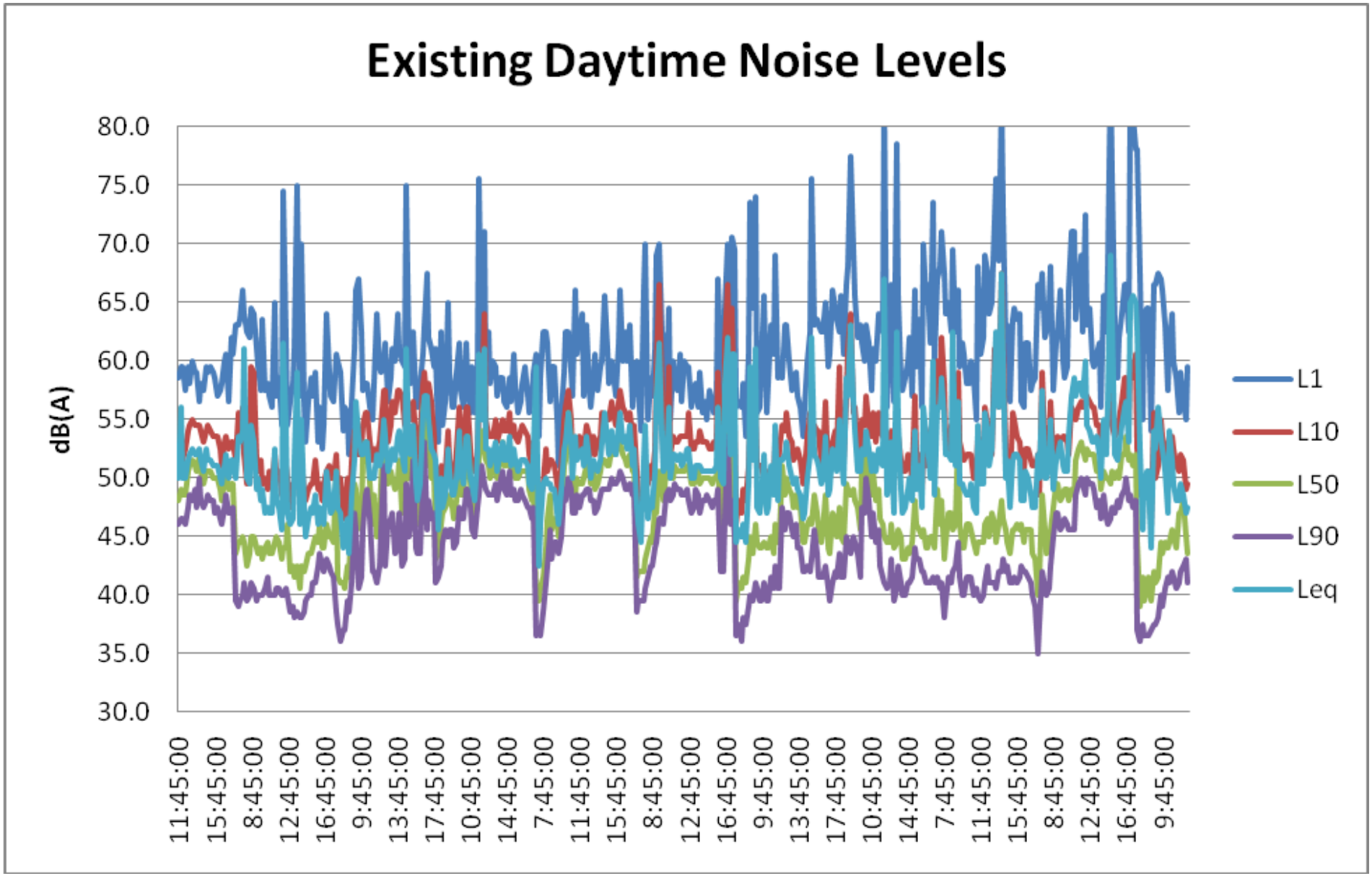
Table 6 below interprets the sound levels in Figure 1 as proportion of the time for which a sound level is exceeded. The L_1 level is above 56 dB(A) for 90% of the time and above 68 dB(A) for 10 percent of the time, while the L_{10} level is above 50 dB(A) for 90 % of the time and above 57 dB(A) for 10 percent of the time. The overall existing equivalent continuous sound level L_{Aeq} is 55 dB(A). The sound levels that are represented by the parameters in Table 6 are generally associated with traffic noise and are, therefore, directly comparable to the sound from trucking activities associated with the dock.

Table 6 Percentage of time for which standard parameter levels are present

	Daytime	
	90%	10%
L1	56.0	68.0
L10	50	57.0

The untreated noise levels from trucks in the dock area at the facades of nearby residences are in the range 55 to 60 dB(A) which is well within the overall existing ambient noise conditions within the area.

The effect of noise levels within the residences from trucks must also be considered. A short term noise level within a residential space of between 50 and 55 dB(A) may temporarily distract people from conversation or watching television. The untreated noise levels at the facade of Mountview would enter a dwelling space in that building though an open door or window to produce sound levels in the range 48 to 53dB(A) and so may occasionally be considered distracting.


Existing Daytime Noise Levels
dB(A)
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
11:45:00
15:45:00
8:45:00
12:45:00
16:45:00
9:45:00
13:45:00
17:45:00
10:45:00
14:45:00
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17:45:00
10:45:00
14:45:00
7:45:00
11:45:00
15:45:00
8:45:00
12:45:00
16:45:00
9:45:00
L1
L10
L50
L90
Leq

Summary of Dock Operational and Access Noise

It is my professional opinion that there is no strongly compelling argument to provide additional noise control structures to control noise associated with vehicles accessing the dock area. However, there is a tangible benefit to be derived from the provision of either a noise barrier or a dock extension to the eastern portion of the dock and allowing the eastern dock doors to remain open for improved operations and smoother dock access.

In the event that an additional structure is considered, on balance, to be desirable then the enclosed dock option extending approximately 16 metres towards Manning Lane is acoustically preferred because it provides better protection to the upper floors of Mountview.

Construction of Barriers Enclosures and Internal Dock Treatments.

Dock Roof

In the first instance the modifications to the dock area require an amendment to the specification of the dock roof from my report number 8179.401.2 and should be configured as follows:-

Roof of loading dock area to be:-

a. Sheet steel roof minimum BMT 0.6mm.

b. Fit minimum 6mm FC sheet or 20mm structural ply to top hats on top of roof structural frame and underneath roof sheet.

c. Provide minimum R1.8 perforated foil faced fiberglass insulation blanket underneath tops hats installed in accordance with manufacturers recommendations.

Dock Barrier and/Extension Walls

Where a noise barrier or an enclosed extension is provided the wall structure may be the same. If an enclosure is provided then the roof of the enclosure should be the same as for the remainder of the dock roof.

Walls of Enclosure/Noise Barrier.

Noise Barrier / enclosure wall to be:-

a. Either Masonry as per dock wall or
CSR compressed FC wall board minimum 9mm thick secured to minimum 140mm steel stud frame or equivalent and finished externally with appropriate architectural finish,

b. Lower portion (approximately 1.8 meters) of the wall to be internally clad with 9mm compressed FC wall board or equivalent for mechanical protection,

c. Upper portion of the wall to be provided with minimum R1.8 perforated foil faced fiberglass insulation batts installed in accordance with manufacturer's recommendations and mechanically protected with steel mesh or similar.

d. If a barrier is to be provided refer to detail at Attachment 1.

Loading Dock Extraction Fan

The extraction fan for the loading dock has originally been proposed as a roof mounted fan located centrally to the dock roof and discharging to atmosphere at that point. It is difficult to obtain a fan with suitable performance characteristics that has satisfactory acoustic properties to enable it to be located as planned on the dock roof.

It is preferred acoustically if the fan is located within the dock area and provided with insulated intake and exhaust ducting so that its acoustic emissions are adequately controlled.

A suitable axial fan may be selected from the Fantech range and mounted in the southern portion of the dock area a distance of approximately 1.5 meters below the roof adjacent to the wall of the shop/ mezzanine area and as far as possible from either of the external roller doors. The fan intakes and discharges should be ducted through two right angled bends internally insulated with 25 mm "Ductliner" for a distance of at least twice the maximum duct dimension each side of the bend. The intake shall be appropriately located within the dock area for adequate ventilation. The discharge duct shall travel though the roof and up the wall of the mezzanine area to discharge to the south over the top of the mezzanine roof. In this configuration a maximum in duct sound power level for the fan should be not more than 80 dB(A).

Conclusions

It must be remembered that the proposed additional treatment options all represent a level of sound mitigation treatments over and above that which is required to achieve compliance with a limit set as a 15 minute equivalent continuous noise level under the requirements under the Industrial Noise Policy. The additional noise controls that are considered in this report relate to short term noise levels associated with the arrival and manoeuvring of trucks. Trucking operations as proposed would not normally cause an exceedance of the INP criteria even if left untreated. The applicant, by way of being a good neighbour, seeks to provide some additional protection against short term noise effects.

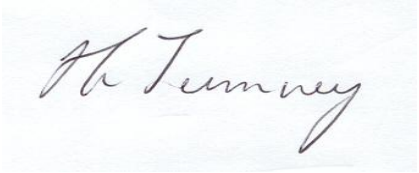
Daytime noise emissions from the general operations of the dock and stock room area will be adequately controlled by the walls of the stockroom and by the loading dock enclosure. General operations of the dock and stock room will be able to be conducted with both external roller doors open provided the stock room doors are closed other than for conducting receiving activities. However, care must be taken during the placement of garbage in the refuse bins to avoid creating excessive noise which will travel to residences in Peel Street.

Noise emissions from refrigerated vehicles and garbage collection vehicles and other noisy activities such as the handling of glass bottles within the dock area need additional control. During those activities the western dock door shall be closed after the vehicle has entered the dock. Controls for the external dock doors should be placed within the stock room to facilitate easy of operation.

The applicant is proposing to provide an additional extension of the dock enclosure to the east which will substantially reduce the overall noise exposure for the residents at Mountview and allow for smoother operations of the dock area.

Overall the proposal for additional works in my opinion has significant acoustic merit and is worthy of favourable consideration.

Yours Sincerely
Hunter Acoustics



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