

11 October 2016

Peet Limited
Level 3, 492 St Kilda Road
Melbourne VIC 3004
Australia

Attention: Mr James Kelly

Dear James

NEWHAVEN ESTATE - RAIL NOISE

Peet Limited (Peet) is developing a residential land development on Leakes Road, Tarneit, to be known as Newhaven Estate. The land is immediately north of and adjacent the Regional Rail Link (RRL), and therefore subject to rail noise from the RRL line.

Requirements for the mitigation of noise from RRL trains are set out in *Schedule 10 to the design and development overlay – Regional Rail Link Section 2 Rail Noise Attenuation (DDO10)* of the Wyndham Planning Scheme. DDO10 states the following:

A permit to subdivide land must require a restriction on titles requiring buildings (and associated works) for accommodation, a child care centre, a display home, a hospital, a hotel or a tavern to be constructed in such a way as to ensure internal bedroom noise levels will not exceed 65 dB L_{Amax} and 40 dB $L_{Aeq,8h}$ for the night period from 10pm to 6am. The restriction may include specific construction requirements to the satisfaction of the responsible authority.

A permit may not be granted to subdivide land which is not in accordance with this requirement.

The following letter details an assessment of rail noise intrusion from the RRL line and future train station, immediately south west of the Newhaven Estate land. Consideration is given to dwellings within the DDO on the subdivision plan for the Newhaven Estate, specifically Stages 2, 4, 5, 6, 21 and 22. A copy of the subdivision plan is attached to this letter.

Reference is made to previous rail noise measurements conducted by Marshall Day Acoustics Pty Ltd (MDA), at a location approximately 900 m east of the Newhaven Estate. Noting the proximity of the future train station, consideration is also given to measurements of train horns at other similar sites, which have been adopted for the purpose of this assessment.

SITE RAIL NOISE LEVELS

Rail noise levels were previously measured by Marshall Day Acoustics (MDA) in September 2015, on the south side of the RRL, approximately 900 m east of the Newhaven Estate site. These measurements are considered representative of current rail noise levels expected at the first row of dwellings at the Newhaven Estate site.

The average measured noise levels are summarised in Table 1. The highest measured value, 52 dB $L_{Aeq,8h}^1$, has been used for this assessment.

¹ The L_{Aeq} noise level is the equivalent continuous A-weighted noise level measured over an 8-hour period. For rail noise, the 8-hour period is usually 10 pm – 6 am (2200 – 0600 hrs).

Maximum noise levels from train pass-bys at the site varied between 70 dB L_{Amax} – 88 dB L_{Amax} ². In accordance with current practice in Victoria, the 95th percentile value of 83 dB L_{Amax} (i.e. maximum noise level not exceeded by 95 per cent of individual train pass-by events) was determined and adopted for this assessment.

Table 1: Summary of rail noise measurements, September 2015

| Date | $L_{Aeq,8h}$ |
|-----------------------------|--------------|
| Thursday, 10 September 2015 | 52 dB |
| Friday, 11 September 2015 | 45 dB |
| Saturday, 12 September 2015 | 50 dB |
| Sunday, 13 September 2015 | 51 dB |

Train horn noise levels

We understand a new train station is proposed to the south west of the Newhaven Estate site. Noise associated with train horns would therefore occur adjacent the Newhaven Estate site as trains approach the new train station. The noise measurements detailed in Table 1, did however not consider train horn noise and thus it is necessary to use noise level measurements from a similar site.

MDA has previously measured horns from trains that use the same rail vehicles as the RRL line, i.e. V/locities (diesel multiple units (DMUs) up to 6 carriages long) and diesel-locomotive-hauled passenger trains. The train horn maximum noise level, determined as the 95th percentile value of measured maximum train pass-by levels was 100 dB L_{Amax} at 20 m from the railway centreline.

As previously determined for the assessment of other sites near the Newhaven Estate development, maximum noise levels were the controlling design parameter when assessing rail noise intrusion as per the DDO10 requirements. Compliance with the internal 65 dB L_{Amax} requirement therefore implies compliance with the 40 dB $L_{Aeq,8h}$ requirement.

From a review of publicly available information, trains will typically sound their horn at the “whistle board,” located approximately 400 m from the eastern end of the station, again on approach to the station, and when departing from the station. Based on the proposed subdivision plan for the Newhaven Estate site, the “whistle board” would be located at approximately the mid point of Stage 6, shown in Figure 1.

The maximum noise level at the nearest dwelling facade to the whistle board is estimated to be 94 dB L_{Amax} accounting for additional distance attenuation and the buffered landscape reserve, based on previous noise level measurements

The following assumptions have therefore been made for the purpose of this assessment:

- That the whistleboard will be located 400 m east of the eastern end of the station; and
- That the horn would also be sounded at some unknown distance less than 400 m on approach to the station.

Thus:

- Dwellings within 140 m to the east of the whistle board location and west of the whistle board – maximum train noise levels controlled by train horn.; and
- Dwellings beyond 140 m the east of the whistle board location – maximum noise levels controlled by train pass by (83 dB L_{Amax} as previously measured).

² The L_{Amax} is the A-weighted maximum noise level, the highest noise level which occurs during the measurement period.

Noting the uncertainty of the whistle board location, treatment to all allotments, adjacent the rail reserve boundary is therefore considered.

Figure 1: Newhaven Estate Subdivision Plan (extract)



ASSESSMENT

An assessment of rail noise impacts based on the above rail noise levels and the following indicative dwelling layouts has been conducted by MDA:

- Henley-Sahara (two storey);
- Homebuyers-Cove;
- Homebuyers-Vibe; and
- Porter Davis-Kingscliff.

The assessment assumes building materials which are initially considered to be the minimum in terms of acoustic performance, but still achieve a 6-star rating for energy efficiency.

Treatment 1 – General DDO affected lots

The following applies to dwelling allotments, where maximum noise levels are controlled by train pass by noise and highlighted green in Figure 1.

Based on the measured external noise levels and the house constructions noted in Table 2, the predicted internal noise levels comply with the noise limits specified in the schedule to DDO10.

These building materials are typical of the lightest constructions in terms of acoustic performance, yet typically achieve the 6-star energy rating. Consequently, most homes that achieve the 6-star energy rating will typically have predicted internal noise levels that comply with the DDO10 requirement.

It is noted that compliance with DDO10 will not generally be achieved with the doors or windows open, and/or evaporative cooling air conditioning systems.

Table 2: Treatment 1 -House construction materials assessed – dwelling lots affected by train passby noise

| Description of Typical Construction to achieve Minimum Acoustic Rating (R_w^1) to achieve the requirements of DDO10 | | | |
|--|---|--|--|
| External walls | Roof-ceiling | Glazing | Doors |
| $R_w > 46$ | $R_w > 44$ | $R_w > 31$ | $R_w > 30$ |
| Typically achieved with: -Lightweight façade material, such as 75 mm Hebel Power Panel XL (33 kg/m ²) -25 mm furring channel -90 mm timber stud framing -Minimum R2.0 insulation placed in cavity -10 mm thick plasterboard (7 kg/m ²) internal wall lining | Typically achieved with: -Pitched roof at 22.5 degrees, consisting metal deck roofing (minimum BMT 0.48 mm) or roof tiles with sarking -Minimum R3.6 insulation in roof cavity -10 mm thick plasterboard (minimum 7 kg/m ²) internal ceiling lining Eaves to be sealed and treated to prevent minimise noise break in to the roof space | Typically achieved with: 4 mm monolithic glass ⁽²⁾ All windows and sliding glass doors shall incorporate full perimeter good-quality acoustic seals which form an airtight seal on closure. | Typically achieved with: Minimum 40 mm solid core with good-quality full perimeter acoustic grade seals which form an airtight seal on door closure |

Notes:

(1) R_w (Weighted Sound Reduction Index) - A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory and is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.

(2) Should home builders select alternative windows for thermal insulation, (e.g. double glazing), care shall be taken such that the acoustic performance of such system meets the minimum sound transmission loss requirements. The final glazing selection will be dependent on size, function, and relevant Australian Design Standards. This assessment considers a variety of bedroom sizes with total glazing areas up to 4 m² per room.

(3) For this assessment, split system air-conditioning systems have been assumed in preference to the more acoustically open evaporative type air conditioning systems. Ventilation paths may be required to be acoustically treated to control noise break-in and ensure that the sound insulation performance of the building envelope is not compromised.

Forms of suitable ventilation may include a ducted system with internal lining or an acoustically rated trickle vent system such as a Silenceair or Titon Trimvent system or an approved equivalent.

(4) Treatment applies to dwellings on allotments as noted in the mark-up on Figure 1 and highlighted green. For the upper level of double storey dwellings, consideration should be given to treatments scheduled in Table 3 for mitigation of rail noise

Treatment 2 - DDO lots - affected by train horn noise

For dwellings located adjacent the rail reserve boundary, the house constructions noted in Table 2 may not be sufficient to comply with the noise limits specified in the schedule to DDO10.

The following building materials detailed in Table 3, are considered to be the minimum in terms of acoustic performance, to achieve the noise limits in the DDO10 schedule for dwelling lots affected by train horn noise located adjacent the rail reserve boundary, and highlighted red in Figure 1.

Table 3: Treatment 2 - House construction materials assessed – dwelling lots adjacent rail reserve boundary

| Description of Typical Construction to achieve Minimum Acoustic Rating (R_w^1) to achieve the requirements of DDO10 | | | |
|---|---|--|--|
| External walls | Roof-ceiling | Glazing | Doors |
| $R_w > 46$ | $R_w > 52$ | $R_w > 32$ for window size up to 2.5 m^2 | $R_w > 30$ |
| Typically achieved with: | Typically achieved with: | Typically achieved with: | Typically achieved with: |
| -Lightweight façade material, such as 75 mm Hebel Power Panel XL (33 kg/m^2) | -Pitched roof at 22.5 degrees, consisting metal deck roofing (minimum BMT 0.48 mm) or roof tiles with sarking | 6.38 mm laminate glass ⁽²⁾ | Minimum 40 mm solid core with good-quality full perimeter acoustic grade seals which form an airtight seal on door closure |
| -25 mm furring channel | -Minimum R3.6 insulation in roof cavity | $R_w > 36$ for window size up to 4 m^2 | |
| -90 mm timber stud framing | -13 mm thick sound rated plasterboard (minimum 13 kg/m^2) internal ceiling lining | Typically achieved with: 10.38 mm laminate glass ⁽²⁾ | |
| -Minimum R2.0 insulation placed in cavity | Eaves to be sealed and treated to prevent minimise noise break in to the roof space | All windows and sliding glass doors shall incorporate full perimeter good-quality acoustic seals which form an airtight seal on closure. | |
| -10 mm thick plasterboard (7 kg/m^2) internal wall lining | | | |

Notes:

(1) R_w (Weighted Sound Reduction Index) - A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory and is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.

(2) Should home builders select alternative windows for thermal insulation, (e.g. double glazing), care shall be taken such that the acoustic performance of such system meets the minimum sound transmission loss requirements. The final glazing selection will be dependent on size, function, and relevant Australian Design Standards. This assessment considers a variety of bedroom sizes with total glazing areas up to 4 m^2 per room.

(3) For this assessment, split system air-conditioning systems have been assumed in preference to the more acoustically open evaporative type air conditioning systems. Ventilation paths may be required to be acoustically treated to control noise break-in and ensure that the sound insulation performance of the building envelope is not compromised.

Forms of suitable ventilation may include a ducted system with internal lining or an acoustically rated trickle vent system such as a Silenceair or Titon Trimvent system or an approved equivalent.

(4) Treatment applies to single and double storey dwellings on allotments as noted in the mark-up on Figure 1. In addition, double storey dwellings within the second row of allotments, the upper storeys should consider these treatments, scheduled in Table 3 for mitigation of rail noise

DISCUSSION

Based on our assessment, allotments where maximum noise levels are controlled by train pass by noise, would not typically require additional noise mitigation works, provided that the home achieves a 6-star rating for energy efficiency.

For allotments marked on the plan as treatment 2, additional building treatment works in the form of higher density ceiling linings and glazing requirements are recommended. Double storey dwellings within the second row of allotments and highlighted green, the upper storeys should also consider additional building treatment works treatments for the mitigation of rail noise.

The findings are based on the noted house designs and nominated constructions referred above. Furthermore, assumptions regarding where trains will sound their horns has been made for the purpose of this assessment. Noting the uncertainty of this assumption, it is considered prudent that the location on where trains will sound their horns and hence the extent of building treatment requirements to particular dwelling allotments be confirmed.

This assessment has been based on conventional glazing. The acoustic performance of glazing systems assessed is based on the minimum sound transmission loss detailed in Table 4.

Table 4: Minimum sound reduction of glazing system

| Glazing system | Weighted sound reduction R_w | Minimum sound reduction (dB) of glazing system at octave band centre frequency (Hz) | | | | | | |
|-------------------|--------------------------------|---|-----|-----|-----|------|------|------|
| | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 |
| 4 mm monolithic | 31 | 15 | 19 | 22 | 28 | 33 | 33 | 28 |
| 6.38 mm laminate | 32 | 17 | 21 | 24 | 30 | 35 | 33 | 39 |
| 10.38 mm laminate | 36 | 21 | 26 | 31 | 34 | 34 | 36 | 46 |

Dwellings that incorporate construction materials with greater sound insulation properties are likely to achieve lower internal rail noise levels. Examples include the following:

Table 5: Alternative construction for increased sound insulation

| External walls | Glazing | Roof-ceiling |
|--|---|---|
| Brick veneer in lieu of Hebel | Thicker monolithic or laminated glazed windows | Higher density internal ceiling lining (e.g. additional layers of 13 mm thick plasterboard with surface density 13 kg/m^2) |
| Higher density internal wall linings (e.g. 13 mm thick plasterboard with surface density 13 kg/m^2) | Doubled glazed units, with significant air cavity and offset glazing pane thickness | |

Homebuilders shall make their own inquiries should they consider alternative construction materials and house designs.

We trust the above is sufficient for your requirements at this time. Should you require any further information, please do not hesitate to contact us.

Yours faithfully

MARSHALL DAY ACOUSTICS PTY LTD



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