



ASSESSMENT OF NOISE AND VIBRATION EFFECTS

PILKINGTON PARK PLAN CHANGE REQUEST
167- 173 PILKINGTON ROAD

PREPARED FOR
Wyborn Capital Investments Limited

DATE
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Acoustic assessment prepared by Styles Group for Wyborn Capital Investments Limited.

REVISION HISTORY

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1.0 Introduction

Wyborn Capital Investments Limited has engaged Styles Group to assess the noise and vibration effects from their private plan change request to rezone land at 167- 173 Pilkington Road, Glen Innes (the **Site**).

The proposal is to rezone the Site from the Light Industry Zone (**LIZ**) to the Business Mixed Use Zone (**BMUZ**) of the Auckland Unitary Plan – Operative in Part (**AUP**).

A precinct overlay with associated precinct standards will be applied to the Site. The controls in the proposed *Pilkington Park Precinct* chapter will be used to specify any variations from or additions to the provisions that would otherwise apply to the Site through the relevant BMUZ and Auckland-wide provisions of the AUP.

This report includes:

- i. An assessment of the compatibility of the proposed BMUZ zoning arrangements with the zoning arrangements that surround the Site
- ii. An assessment of the actual and potential rail noise and vibration effects from the North Island Main Trunk Line (**NIMT**)¹ and road-traffic noise effects from arterial roads (Apirana Avenue and Pilkington Road), along with recommendations to manage potential effects on future Activities Sensitive to Noise² (**ASN**) within the Pilkington Park Precinct.

2.0 The proposal

The proposal is to enable mixed-use development on the Site.

The BMUZ activity table anticipates and provides for a range of commercial and noise sensitive activities. ASN in the BMUZ are permitted, where they are acoustically treated³ from the noise levels permitted in the BMUZ⁴.

The Design Report prepared by Warren and Mahoney dated May 2022 considers the potential future redevelopment opportunities shown in Figure 1, with the Site to be divided into 8 super lots (1, 2, 3A, 3B, 4A, 4B, 5A and 5B). The Design Report includes a High-Density Scheme that proposes 593 apartment units and 118 terrace units, as well as commercial areas and a community hub.

¹ Including the Eastern Line

² Defined in Chapter J1 of the AUP as “Any dwelling, visitor accommodation, boarding house, marae, papakāinga, integrated residential development, retirement village, supported residential care, care centres, lecture theatres in tertiary education facilities, classrooms in education facilities and healthcare facilities with an overnight stay facility.”

³ Standard E25.6.10

⁴ And from the noise generated from any other adjacent Business Zone.



Figure 1 Indicative scheme layout

3.0 The Site and surrounding environment

Figure 2 displays the operative zoning arrangements according to the AUP; whereby:

- The Site and the adjacent land on the western side of the NIMT are zoned LIZ
- The NIMT runs along the western boundary of the Site
- The BMUZ applies to land to the west and south of the Site, including the “Te Tauoma” mixed use development that occupies the former Tamaki campus of the University of Auckland
- The Glen Innes town centre to the north of the Site is in the Local Centre Zone (**LCZ**)
- The residential areas to the east and north-east of the Site are primarily zoned Residential Terrace Housing and Apartments Zone (**THAB**). Residentially dwellings in the THAB are not required to be acoustically treated.

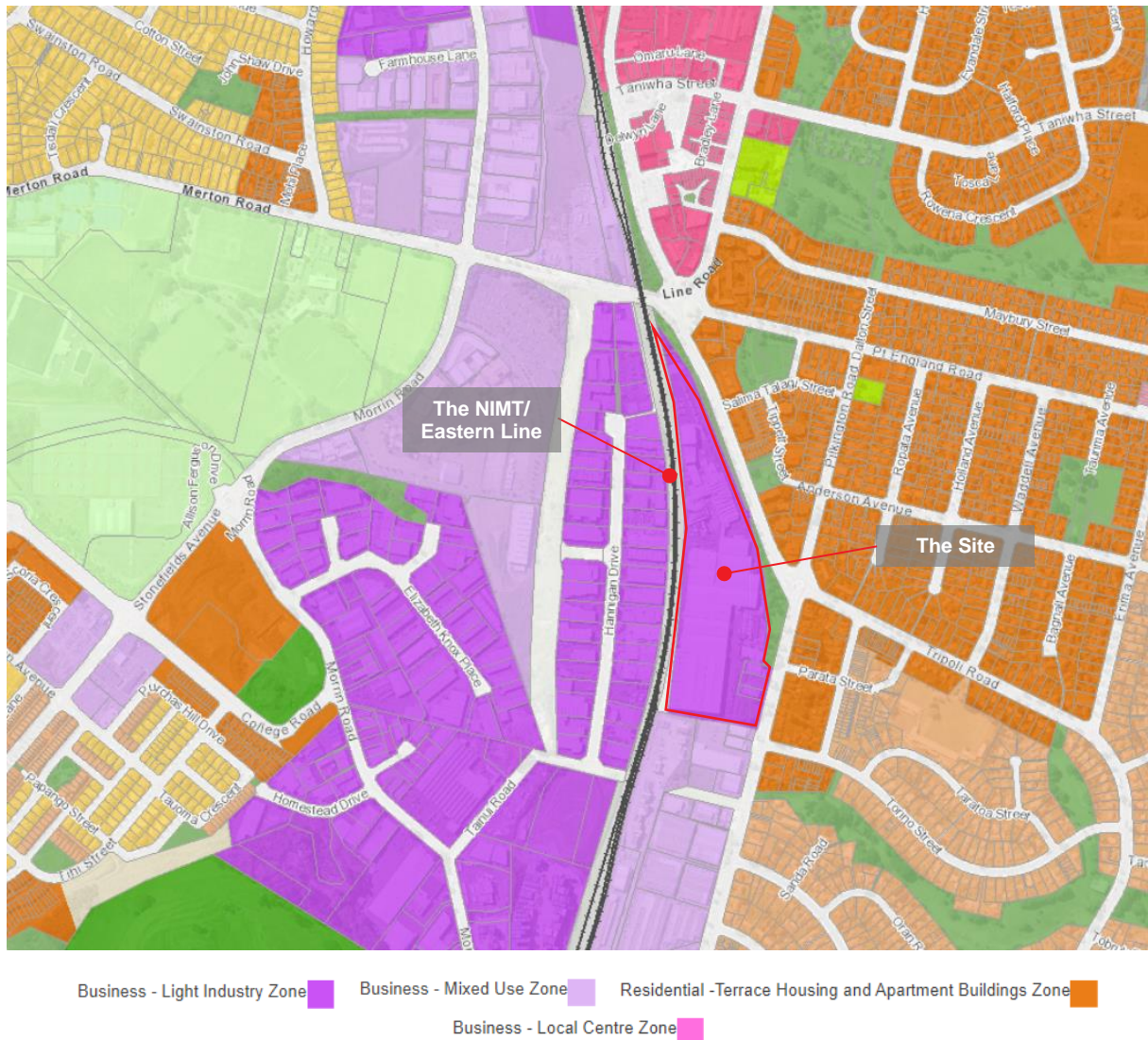


Figure 2 Zoning of the Site (red outline) and surrounding area

4.0 The existing legal noise environment

The permitted noise standards in Chapter E25 of the AUP control the level of noise that may be generated between sites in the same zone and between zoning interfaces.

The business zone interface noise standards are designed to ensure that the noise levels from activities in business zones (such as the LIZ) are compatible with non-acoustically treated dwellings in Residential Zones located near to the business zone interface (such as the THAB in this case).

The current LIZ zoning enables the following noise levels to be generated from the Site:

- i. Any activity on the Site is able to generate noise levels of up to 65 dB L_{Aeq} at any time⁵ when measured at any other site in the LIZ
- ii. Any activity on the Site must also operate in compliance with the business zone interface noise limits in Standard E25.6.19 of the AUP. This standard requires compliance with the following noise levels when measured and assessed at the boundary of a site in a Residential Zone.

Time	Noise level
Monday to Saturday 7am-10pm	55dB L_{Aeq}
Sunday 9am-6pm	
All other times	45dB L_{Aeq} 60dB L_{eq} at 63 Hz 55dB L_{eq} at 125 Hz 75dB L_{AFmax}

The zoning map in Figure 1 shows that the noise generating potential of any LIZ activity operating on the Site is constrained by the proximity of the THAB zone to the east of the Site and the requirement to meet the business zone interface noise limits.

4.1.1 Activities sensitive to noise in the LIZ

The LIZ activity table anticipates and provides for manufacturing, production, logistics, storage, transport and distribution activities. The permitted noise environment in the LIZ seeks to enable light industrial activities to operate efficiently and effectively. ASN are generally precluded in the LIZ, with the exceptions of a tertiary education facility (where it is accessory to an industrial activity on the site) and one workers accommodation per site.

The current zoning arrangements therefore generally preclude the establishment of ASN on the Site.

5.0 The proposed noise environment

A BMUZ zoning would maintain the current daytime noise limit of 65 dB L_{Aeq} between the Site and the adjacent LIZ sites. However, a BMUZ zoning will introduce the requirement for the adjacent LIZ sites to meet the noise levels in Standard E25.6.8 when measured and assessed as the incident level on the façade of the Site:

Table E25.6.8.1 Noise levels in the Business Mixed Use Zone (abridged)

Time	Noise level
7am – 11pm	65dB L_{Aeq}

⁵ Standard E25.6.5 of the AUP

11pm – 7am	55 dB L _{Aeq} 65dB L _{eq} at 63 Hz 60dB L _{eq} at 125 Hz 75dB L _{AFmax}
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The BMUZ noise limits in Table E25.6.8.1 will introduce:

- A night time noise level of 55 dB L_{Aeq} (10 dB lower than the current noise limits)
- A 75dB L_{AFmax} noise limit (no night time L_{AFmax} controls apply within the LIZ)
- Low frequency noise limits of 65dB L_{eq} at 63 Hz and 60dB L_{eq} at 125 Hz.

The BMUZ noise limits in Table E25.6.8.1 will also control the noise levels that can be generated and received between sites within the Pilkington Park Precinct.

E25.6.19 *Business Zones Interface* will continue to control the maximum potential noise levels that may be generated from the Site when received at any nearby Residential Zone, including the nearby THAB zone to the east.

5.1.1 ASN in the BMUZ

The BMUZ activity table anticipates and provides for a mix of residential and non-residential activities. The AUP relies on the acoustic treatment requirements in Standard E25.6.10 to ensure ASN are compatible with the permitted noise levels in business zones.

Standard E25.6.10 requires that all noise sensitive spaces must be acoustically treated from the noise levels authorised in the BMUZ (and from any adjacent business zone). Noise sensitive spaces must be designed and constructed to achieve the following internal noise levels:

Unit affected	Time	Noise level
Bedrooms and sleeping areas	Between 11pm and 7am	35dB L _{Aeq} 45 dB at 63Hz L _{eq} and 40 dB at 125Hz L _{eq}
Other noise sensitive spaces	At all other times	40 dB L _{Aeq}

E25.6.10(2) requires that noise sensitive spaces are provided with mechanical ventilation and cooling. The requirements of clause G4 of the New Zealand Building Code must also be met. These requirements ensure an adequate exchange of air to remove contaminants and moisture. Jointly, these requirements are designed to ensure that occupants of noise sensitive spaces can close external windows and doors to reduce external noise levels, and still remain adequately ventilated and thermally comfortable.

We consider that Standard E25.6.10 will ensure ASN are adequately protected from the level of noise that might be generated from surrounding BMUZ and LIZ activities.

Standard E25.6.10 will not provide any level of protection to the outdoor living areas associated with ASN. We also note that Chapter E25 of the AUP does not require the acoustic treatment requirements to take into account the noise from transport corridors.

Sections 8.0 and 9.0 includes an assessment of the noise effects from the adjacent NIMT and arterial road networks, along with recommended precinct standards to manage the residual noise effects that would not otherwise be managed through the acoustic treatment requirements in Standard E25.6.10.

6.0 Summary of the change in noise environment

The permitted noise levels arising from the proposed rezoning are generally similar to the existing noise environment:

- i. The permitted noise standards for activities in the BMUZ and LIZ both authorise daytime noise levels of up to 65 dB L_{Aeq} ⁶.
- ii. The proposal will maintain the existing noise limits for noise received at noise-sensitive Residential Zones (i.e. the THAB to the east).

The key differences between the operative and proposed zoning arrangements relate to:

- i. The establishment of ASN on the Site. ASN are generally precluded in the LIZ, whereas the BMUZ anticipates and provides for acoustically treated ASN.
- ii. A BMUZ zoning will introduce a night time noise limit (for noise generated from the LIZ and received at the Site) of 55 dB L_{Aeq} . This noise limit is 10 dB lower than the current noise limit. A noise limit of 75dB L_{AFmax} and low frequency controls will also apply during the night time period.

7.0 Effects on the Hannigan Drive LIZ Activities

The land to the west of the Site (on the western side of the NIMT) is zoned LIZ and includes several industrial lots accessed from Hannigan Drive. This area is currently occupied by a diverse range of commercial and light industrial activities⁷. We refer to this area as the Hannigan Drive LIZ Area.

As set out above, a BMUZ zoning across the Site will require⁸ activities in the Hannigan Drive LIZ Area to meet the noise standards applying within the BMUZ. This will essentially require

⁶ When measured and assessed at any other site in the LIZ, or BMUZ

⁷ Including two large storage facilities, a diesel mechanic, a bakery, a ready lawn landscaping supply store, a sporting goods store, landscaping depot, two dance schools, furniture store, a photography studio, lunch bar, property investment and financial services, a delicatessen and a chicken processing plant.

⁸ Through E25.6.22 *All other zone interfaces*

the Hannigan Drive LIZ activities to meet a night time noise limit that is 10dB lower than the current noise limits. The LIZ activities will also need to meet an $L_{AF(max)}$ limit of 75dB and low frequency noise limits at all sites in the BMUZ.

Our survey of the area as it exists now is that very few of the activities are of an industrial character or scale likely to generate noise levels up to the maximum permitted LIZ noise levels. The proposed zoning is unlikely to introduce any constraint to the existing activities.

However, have assessed the potential for noise constraint in a scenario where each lot in the Hannigan Drive LIZ Area was generating the maximum permitted noise levels authorised by the operative zoning arrangements by reviewing the operating zoning pattern displayed in Figure 3.

Figure 3 demonstrates that the western, northern and southern Hannigan Drive LIZ activities are already constrained by the requirement to meet the nighttime BMUZ noise limits applying at the nearby BMUZ sites to the north, west and eastern boundaries.

The nighttime noise emissions from the LIZ sites along the eastern side of Hannigan Drive are also already constrained significantly by the need to comply with the much lower business interface noise limits at the THAB (Residential) zone to the east.

Overall, we consider that any constraint arising from a BMUZ zoning on the Site is likely to be nil or very low due to:

- i. The Eastern Line providing a 25m wide corridor and separation distance from the eastern boundary of the Hannigan Drive LIZ Area from the western boundary of the Site.
- ii. The existing requirement for the LIZ activities to meet a noise limit of 65 dB L_{Aeq} at the immediate boundary of any other site in the LIZ. The LIZ lots are small, so the existing compliance points are very close.
- iii. The existing requirement for the LIZ activities to meet night time noise limits of 55 dB L_{Aeq} all adjacent BMUZ zones
- iv. The existing requirement for the LIZ activities to meet the much lower night time noise limits of 45 dB L_{Aeq} at all sites in the THAB zone.

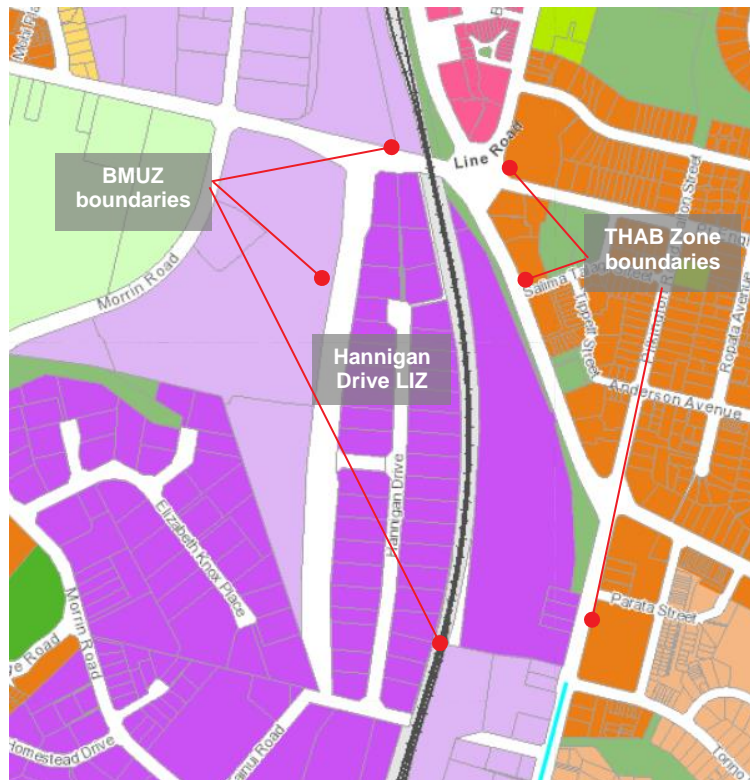


Figure 3 Existing constraints on the noise generating potential of the Hannigan Drive LIZ

8.0 Noise and vibration effects from the NIMT

The NIMT and Eastern Line operate within the rail corridor on the western boundary of the Site.

We monitored rail noise and vibration levels on the Site between 7 February 2024 and 23 February 2024 to determine whether rail movements (including electrified, commuter rail service and diesel freight trains) have the potential to generate noise and vibration effects on the Site.

8.1 Context

The AUP does not include any Auckland-wide controls to manage the noise or vibration effects of ASN or other sensitive land use activities adjacent to major transport corridors. Notwithstanding, we are aware of⁹ and have been involved in the development of several recent precinct chapters that include controls to manage noise effects from rail traffic on zones that anticipate and provide for ASN.

We support the application of precinct controls to ensure that the effects will be reasonable for the future noise-sensitive occupants of the Site. If the precinct standards ensure that effects

⁹ For example, the Waihoehoe Precinct standards
<https://www.aucklandcouncil.govt.nz/UnitaryPlanDocuments/pc-50-precinct-provisions.pdf>

from the NIMT will be reasonable, there should be no reverse sensitivity effects on the rail operator.

8.2 Assessment of noise effects from the NIMT

Styles Group deployed a sound level meter on the Site from 7 February to 23 February. The instrumentation comprised a 01dB Cube logger with an outdoor microphone kit, sound recording, 1/3rd octave band recording and logging in one second intervals, meeting IEC651 Type 1 accuracy criteria. The sound level meter was deployed 5m from the building facade at a height of 5m from the ground. Figures 4 and 5 display the measurement setup and location. All measurement and assessment of the data has been undertaken in accordance with the relevant sections of NZS6801:2008 and NZS6802:2008.



Figure 4 Sound level meter on Site

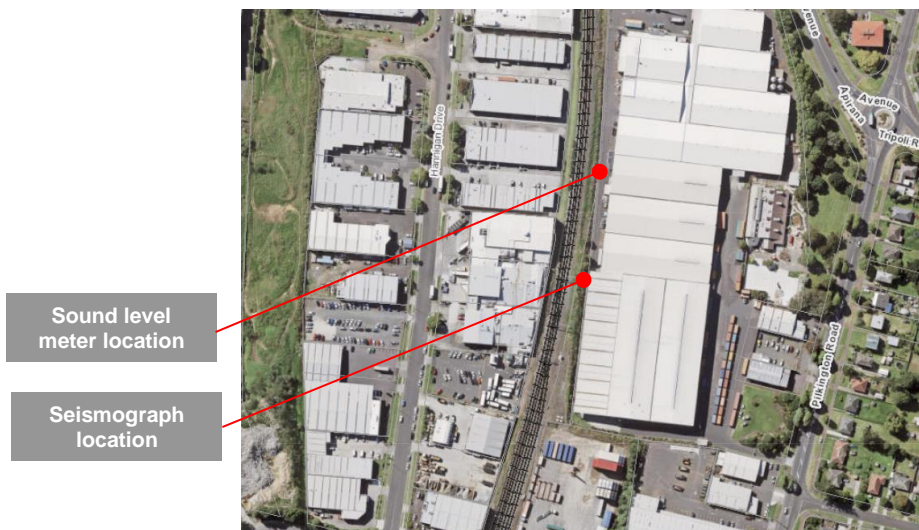


Figure 5 Measurement positions on the Site

8.2.1 Rail noise measurement results

We measured over 60 freight train pass-by events during the measurement period. The Sound Exposure Level (**SEL**) for the loudest 6 freight pass-by events ranged from 96.7dBA to 100.5dBA, with a logarithmic average of 99.6dBA.

An SEL of 99.6 dBA equates to 67 dB $L_{Aeq(1hr)}$ for two freight train pass-by events in a one-hour period¹⁰ at the measurement position 15m from the track. This level increases to 68dB $L_{Aeq(1hr)}$ when adjusted to be 12m from the rail line.

We measured a significant number of passenger train pass-by events during the measurement period. The SELs for the loudest 6 passenger train pass-by events were 11dB quieter than the freight trains. This confirms that the freight train pass-bys should form the basis of the precinct controls and building designs.

8.2.2 KiwiRail's Policy for rail noise

The KiwiRail Policy recommends that all noise sensitive activities that are within 100m of the railway network are designed, constructed and maintained to achieve the specified indoor design noise levels for the relevant occupancy.

The KiwiRail Policy requires that internal design noise levels are achieved based on KiwiRail's criteria for rail noise, whereby:

“Railway noise is assumed to be 70 dB $L_{Aeq(1\ hour)}$ at a distance of 12 metres from the track and must be deemed to reduce at a rate of 3 dB per doubling of distance up to 40 metres and 6 B per doubling of distance beyond 40 metres”.

The KiwiRail Policy requires noise sensitive rooms¹¹ to be provided with mechanical ventilation and cooling (where windows and doors must be closed to achieve the indoor noise levels). The internal noise levels are generally consistent with those specified in Standard E25.6.10.

The measured level of 68dB $L_{Aeq(1hr)}$ is 2dB lower than the level of 70dB $L_{Aeq(1hr)}$ at 12m for two freight trains per hour that KiwiRail adopt in their Policy. We consider that the adoption of KiwiRail's source level provides a sufficient margin of safety to allow for variance across the rolling stock.

We understand that the appropriate extent of the rail noise effects area was examined closely in the creation of the Waihoehoe Precinct Chapter. In that case, KiwiRail sought a 100m effects area but agreed on a 60m effects area to control noise effects from the NIMT.

¹⁰ Consistent with KiwiRail's guidelines for freight pass-bys

¹¹ The AUP definition of ASN is more narrow than those activities captured by the KiwiRail definition. The KiwiRail definition of ASN applies to Hospitals or healthcare clinics or facilities that do not involve an overnight stay, restaurants, recreational facilities, Places of assembly, churches and other buildings designed for large gatherings of people and commercial offices

We consider that a rail noise effects area of 60m would be appropriate in this case also, particularly as all ASN constructed on the Site beyond the 60m rail noise effects area will still be required to be acoustically treated in accordance with E25.6.10.

8.2.3 Recommended Precinct standards to manage rail noise effects

We have worked with the Project Team to develop a standard to manage rail noise effects inside buildings containing ASN.

We recommend that the precinct standards deliver the following outcomes:

- That the acoustic design takes into account the cumulative level of external noise from the railway corridor and the maximum level of noise permitted by the zoning / precinct arrangements
- That the standard specifies a clear pathway to determining the rail noise levels across the site and to allow for computer noise modelling as a permitted activity
- Require mechanical cooling and ventilation in accordance with the underlying AUP provisions where windows and doors of noise sensitive spaces must be closed to reduce rail noise
- Provide a pathway to exempt noise sensitive spaces from the acoustic treatment requirements where they can readily demonstrate that they are acoustically screened from the rail line by built form

The recommended precinct standard is set out below:

IX.6.2. Standard for activities sensitive to noise

Purpose: To ensure activities sensitive to noise adjacent to the railway corridor and arterial roads are designed to protect people's health and amenity while they are indoors and that such activities do not unduly constrain the operation of the rail corridor.

- (1) Any new noise sensitive space or alteration to an existing noise sensitive space with a façade within 60 metres of the rail corridor, must be designed, constructed and maintained to ensure that rail noise does not exceed internal noise levels of 35 dB $L_{Aeq}(1 \text{ hour})$ for sleeping areas and 40 dB $L_{Aeq}(1 \text{ hour})$ for all other habitable spaces.

Note:

- a. The source level for railway noise is 70 $L_{Aeq}(1h)$ at a distance of 12 metres from the nearest track;
- b. The attenuation over distance is:
 - i. 3 dB per doubling of distance up to 40 metres and 6 dB per doubling of distance beyond 40 metres; or
 - ii. As modelled by a Suitably Qualified and Experienced Acoustic Consultant using a recognised computer modelling method for freight trains with diesel locomotives, having regard to factors such as barrier attenuation, the location of the dwelling relative to the orientation of the track, topographical features and any intervening structures.

- (2) If windows and doors must be closed to achieve the design noise levels in Standard IX.6.2(1), the building must be designed, constructed and maintained with a mechanical ventilation / cooling system that meets the requirements of E25.6.10(3)(b) and (d) to (f).
- (3) Standards IX.6.2(1) and IX.6.2(2) do not apply where:
 - (a) The façade of any new or altered noise sensitive space is screened from all parts of the rail corridor by a proposed building(s) under the same land use consent or a building(s) existing as at XX XXX 202X; or
 - (b) The façade of any new or altered noise sensitive space is partially screened from the rail corridor by a proposed building(s) under the same land use consent or a building(s) existing as at XX XXX 202X, and the closest viewing distance from the facade is over 100m from the rail corridor.

Note: The design shall be based on the cumulative level of external noise from the railway corridor in IX.6.2(1) and the maximum level of noise permitted by the zone or precinct standards or any adjacent zone or precinct standard to comply with E25.6.10.

8.3 Rail vibration

We undertook vibration measurements on the Site over a 7-day period from 8 February 2024 using a Texcel ground vibration monitor and geophone. The instrument was located on the Site approximately 12m from the track in the locations shown in Figures 5 and 6. The instrument was set to log PPV, PVS, RMS and average values in all axes in contiguous 5 second samples.

The geophone was coupled to a concrete-encased column used to support the lightweight roof over a loading dock. The geophone was coupled using a solid timber block that was securely clamped to the concrete at a height of approximately 100mm above the ground. The geophone was located close to both the rail line and the main loading dock area which was frequented by trucks and forklifts throughout the day – many within 1m of the instrument. Our assessment of the data has concentrated on the vibration events occurring at night time when the loading dock is not in use. The vibration event data for freight train pass-bys coincides with the audio recordings from our noise measurements.

The data produced by this instrument is not strictly comparable with the 0.3mm/s vw95 criteria recommended in the KiwiRail Policy¹² but it remains useful to demonstrate the general nature of the vibration levels on the site.

¹² All Styles Group equipment capable of producing data for direct comparison with the vw95 criteria was deployed on other sites over the period that the second Clause 23 request was provided to us and when our response was required.

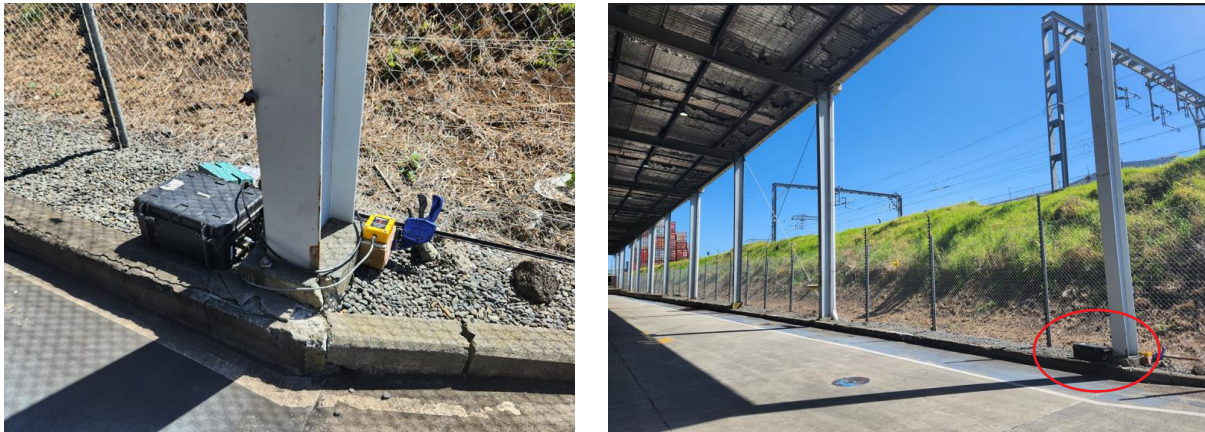


Figure 6 Seismograph on the Site

8.3.1 KiwiRail's rail vibration policy

KiwiRail's Policy recommends that any new or altered buildings used for a noise sensitive activity that are located within 60m of the boundary of a railway network are designed and constructed to achieve rail vibration levels not exceeding 0.3mm/s vw95. Alternatively, the Policy includes a construction schedule that requires buildings to be constructed on a vibration isolating floor slab. These requirements are designed to ensure that vibration levels inside ASN are reasonable for the occupants, assuming a reasonably frequent passage of freight trains¹³.

We note that KiwiRail's rail vibration controls are not routinely adopted in plan changes. Many recent plan changes have resulted in a vibration alert area rather than a rail vibration standard.

For example, the Operative Waihoehoe Precinct Chapter¹⁴ does not include any specific vibration standards to manage potential effects from trains on the North Island Main Trunk (NIMT) line. The Decision records the Panel found that there was "*insufficient evidence to warrant imposing controls*". Waihoehoe Precinct Plan 4 includes a rail vibration plan that identifies the land within 60m of the edge of the track is subject to "*vibration levels higher than what would normally be expected, because of proximity to the rail corridor*". This essentially comprises an 'alert' area on the precinct plan.

8.3.2 Rail vibration measurement results

The instrument recorded a significant number of freight train pass-bys for analysis. The vibration levels were variable between pass-bys, but typically ranged between 0.3mm/s PPV and 0.5mm/s PPV. These events are likely to be just perceptible to a person. The RMS velocities for comparison with the 0.3mm/s vw95 criteria are likely to be at least 3-4 times lower than the measured PPV values based on our experience of rail vibration elsewhere in Auckland

¹³ Commuter trains with a low unsprung weight generate low levels of vibration.

¹⁴ <https://www.aucklandcouncil.govt.nz/UnitaryPlanDocuments/pc-50-fully-operative.pdf>

and New Zealand. We expect that the weighted RMS velocity for a single pass-by is likely to be less than 0.2mm/s when measured on the existing lightweight footings.

Our observations of passenger train pass-bys is that any vibration generated is imperceptible at the boundary on the concrete surface of the loading dock.

We consider that the significant additional mass of the buildings that are likely to be developed will reduce the vibration levels further.

8.3.3 Recommendations to manage vibration effects from the NIMT

The measurement results demonstrate that the level of ground borne rail vibration received on the Site is low. We consider that a level of 0.3mm/s vw95 will be readily achieved inside future buildings without specific design treatments. We do not consider that any vibration design standards are required to be incorporated in the Precinct standards.

9.0 Noise effects from arterial road-traffic

We have predicted the road-traffic noise levels from Apirana Avenue and Pilkington Road across the Site using the traffic flow predictions set out in the ITA (lodged with the Request), the posted speed environment and the existing asphalt road surface.

The current road traffic noise levels are predicted to be approximately 62dB $L_{Aeq(24hr)}$ at the part of the Site that is closest to Apirana Avenue. In other parts of the Site, the closest buildings would be much further away and are predicted to receive approximately 56dB $L_{Aeq(24hr)}$. We expect that the nighttime noise levels will be significantly lower than the $L_{Aeq(24hr)}$ levels due to the high proportion of commuter traffic and relatively low volume of trucks that would be present once the development of the Site takes place (removing the heavy traffic that is generated by current activities on Site). The noise levels would be highest at the lower levels of future buildings and will reduce with floor height and may reduce enough in some cases to avoid the need for any acoustic treatment at all.

A detailed noise model would be required to determine the road traffic noise level on each façade and to determine which units would require acoustic treatment. This work can only be done when the building designs are known.

Our predicted road-traffic noise levels are approximately consistent with or less than the noise levels authorised by the BMUZ zoning. However, Standard E25.6.10 would allow the majority of the facades along Pilkington Road and Apirana Avenue to be acoustically ‘untreated’ given that the noise levels from the THAB zone (on the opposite side of the same roads) would be low. This could lead to future road traffic noise levels exceeding a reasonable level inside the closest and most exposed habitable rooms. Accordingly, the acoustic treatment requirements in Standard E25.6.10 may not adequately mitigate the future road traffic noise levels inside the closest ASN.

9.1 Recommendations to manage road-traffic noise

We have worked with the Project Team to develop a standard that will ensure the noise sensitive spaces of ASN within 60m of Apirana Avenue or Pilkington Road are adequately protected from road-traffic noise. The predictions indicate that road-traffic noise levels no greater than 40dB $L_{Aeq24hr}$ inside noise sensitive spaces can be achieved, provided that windows and doors facing Pilkington Road and Apirana Avenue can be kept closed.

We have recommended precinct standards that required any new noise sensitive space or alteration to an existing noise sensitive space within 60m of Apirana Avenue or Pilkington Road where the road traffic noise level is predicted to exceed 55dB $L_{Aeq(24hr)}$ to be designed, constructed and maintained with a mechanical ventilation / cooling system that meets the requirements of E25.6.10(3)(b) and (d) to (f). We have recommended that the external road traffic noise level predictions are based on the traffic volumes at the time of the design, with an additional 2dB added to account for possible future traffic growth.

The recommended standard is set out below:

Any new noise sensitive space or alteration to an existing noise sensitive space within 60m of Apirana Avenue or Pilkington Road where the road traffic noise level is predicted to exceed 55dB $L_{Aeq24hr}$, must be designed, constructed and maintained with a mechanical ventilation / cooling system that meets the requirements of E25.6.10(3)(b) and (d) to (f).

Note: The design shall be based on predicted road traffic noise levels ten years after the noise sensitive space is first occupied

10.0 Recommendations to manage effects on ECEs

The BMUZ activity table anticipates for early childcare education centres (ECEs). The acoustic treatment requirements in Standard E25.6.10 apply to ECE's but do not mitigate the level of noise received in outdoor play areas. Outdoor play areas are an integral part of early childhood education activities.

The Ministry of Education (MoE) licencing requirements for ECEs require that noise levels in outdoor play areas must not unduly interfere with normal speech and/or communication, or cause any child attending distress or harm.

We understand that MoE may withhold ECE operators from obtaining a license on grounds of high external noise levels in outdoor play areas. We consider that managing noise effects from the NIMT and adjacent LIZ area is an important consideration to achieve compatibility between any ECE and potential noise-generators in the surrounding environment.

10.1 Recommended precinct standard to manage noise effects on outdoor play areas adjacent to the NIMT

We have worked with the Project Team to develop a standard that will require any outdoor play areas for ECEs to be located and or designed to manage the cumulative noise exposure from the NIMT and the noise levels permitted by the zoning / precinct arrangements.

The recommended standard is set out below.

IX.6.3. Standards for outdoor play areas within 60m of the rail corridor

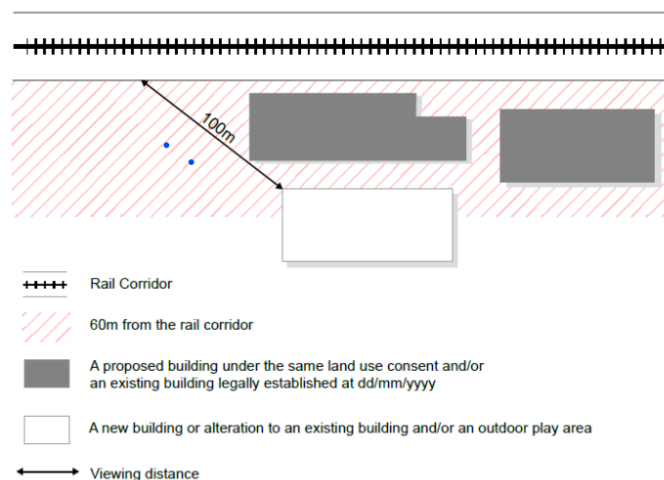
Purpose: To ensure that outdoor play areas adjacent to the railway corridor are designed and located to protect people's health and amenity and that such activities do not unduly constrain the operation of the rail corridor.

- (1) Any new outdoor play area of any care centres for a childcare centre, creche, kindergarten, kohanga reo, play centre, play group, early childhood learning service or an after school care centre within 60 metres of the rail corridor, must be designed, constructed, and maintained so that the cumulative level of rail and noise from the Business Zones does not exceed 55 dB $L_{Aeq}(1hour)$.
- (2) Standard IX.6.3(1) does not apply where:
 - (a) Any new outdoor play area is screened from all parts of the rail corridor by a proposed building(s) under the same land use consent or a building(s) existing as at XX XXX 202X. The screening must screen all parts of the outdoor play area up to 1.5m above the play area surface, and excluding play equipment, from the rail corridor; or
 - (b) Any new outdoor play area is partially screened from the rail corridor by a proposed building(s) under the same land use consent or a building(s) existing as at XX XXX 202X and the closest viewing distance from the play area is over 100m from the rail corridor.

Note: The design shall be based on the cumulative noise level from rail in IX6.2(1) and the noise levels that are permitted to be generated from neighbouring sites in the Business – Mixed Use and Business – Light Industry zones. The level shall be assessed at any point 1.5m above the main play surface of the outdoor play area.

- (3) Where Standard IX.6.3(1) applies, a report must be submitted by a suitably qualified and experienced person to the council demonstrating compliance with Standard IX.6.3(1)

Figure IX6.2.3.1 and IX6.3.2.1: viewing distance to the rail corridor.



11.0 Summary

The Plan Change proposes a BMUZ zoning across the Site to provide for a range of residential and commercial activities. The acoustic treatment requirements in Standard E25.6.10 require that any ASN in the BMUZ are acoustically treated from the noise levels that are permitted to be generated in business zones.

The Site is also exposed to noise effects from the adjacent NIMT and arterial road corridors. We have therefore considered whether any additional mitigation is required to ensure future ASN on the Site are adequately protected from transport noise.

We have worked with the Project Team to develop precinct standards to ensure that the acoustic treatment of ASN adjacent to the road and rail network takes into account noise from the respective corridors, in addition to the permitted noise levels from activities in the BMUZ and the adjacent LIZ. We have also recommended a precinct standard to manage noise effects in outdoor play areas of any ECE near to the NIMT.

We have not identified any noise constraints on the Hannigan Drive LIZ Area from the proposed BMUZ zoning arrangements. The noise emissions from the Hannigan Drive LIZ Area will continue to be controlled by the proximate noise compliance points at other nearby operative BMUZ and THAB zones.

We consider that the combination of the controls in Chapter E25 and the proposed precinct standards will ensure that the noise effects on future occupants of the Site will be reasonable. It is our experience that if the noise levels are managed to be reasonable on ASN, the proposal will adequately avoid the potential for a reverse sensitivity effect on the surrounding noise-generating activities.