Styles Group
Acoustics & Vibration Consultants

ASSESSMENT OF NOISE EFFECTS

PROPOSED PLAN CHANGE PUKEKOHEKOHE GATEWAY PRECINCT AND PUKEKOHE PARK PRECINCT

PREPARED FOR

Auckland Thoroughbred Racing

DATE

12 November 2025

Assessment of noise effects prepared by Styles Group for Auckland Thoroughbred Racing.

REVISION HISTORY

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Appendices

1.0 Introduction

Auckland Thoroughbred Racing (**ATR**) has engaged Styles Group to provide acoustic advice for the proposed private plan change (**PPC**) application within its landholdings at 222-250 Manukau Road, Pukekohe (the **Site**). The PPC Site comprises the Pukekohe Park Precinct in Chapter I434 of the Auckland Unitary Plan (Operative in Part) (the **AUP**).

The PPC proposes to modify the boundaries of the Pukekohe Park Precinct and to remove motorsport as a permitted activity inside the Precinct. The PPC proposes to rezone 22.96ha of land within the Residential – Mixed Housing Urban Zone (the **Residential Zone**) and to include the proposed Residential Zone within a new Precinct, the "*Pukekohekohe Gateway Precinct".* The PPC also proposes the rezoning of a site occupied by a designated Watercare pumpstation to the Business- Light Industry Zone (**LIZ**).

A glossary of acoustical terms used within this document is attached as Appendix A

1.1 Scope of this assessment

We have assessed the compatibility of the proposed zoning arrangements in the context of the zoning arrangements and land transport corridors surrounding the Site. This report addresses the following matters:

Rail and road traffic noise effects on future Activities Sensitive to Noise (ASN[1])

We have assessed the potential noise and vibration effects from the North Island Main Trunk (**NIMT)** railway line and road traffic noise effects from Buckland Road on future ASN inside the Pukekohekohe Gateway Precinct.

This assessment sets out the basis for the proposed precinct provisions that are designed to ensure that Noise Sensitive Spaces[2] adjacent to the NIMT and Buckland Road will be designed, constructed and maintained to provide occupants with an adequate level of internal noise amenity.

Compatibility with activities in the Pukekohe Park Precinct

We have assessed the potential noise effects from ongoing activities within the Pukekohe Park Precinct (i.e. horse racing, indoor and outdoor events involving amplified music, and professional fireworks displays) to determine the nature of any precinct controls that that may be required to achieve land use compatibility between the Pukekohe Park Precinct and ASN within the Pukekohekohe Gateway Precinct.

[1] ASN are 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."

[2] Noise Sensitive Space is defined in Chapter J1 of the AUP as "Any indoor space within an activity sensitive to noise excluding any bathroom, water closet, laundry, pantry, walk in wardrobe, corridor, hallway, lobby, stairwell, clothes drying area, kitchens not part of a dwelling, garage or other space of a specialised nature occupied neither frequently nor for extended period".

Assessment of compatibility and potential reverse sensitivity effects on the proposed Light Industry Zone and adjacent General Business Zone

We have assessed the noise effects from the operation of the Watercare pumpstation (in the proposed LIZ) to confirm the noise levels can comply with the permitted noise standards for noise generated between the LIZ and the proposed Residential Zone within the Pukekohekohe Gateway Precinct.

The Site is adjacent to the General Business Zone (**GBZ**) on 301 and 303 Buckland Road. We have undertaken a comprehensive assessment of the consented development plans, reviewed the compliance locations that form part of the legally existing noise environment and undertaken noise modelling to confirm that the establishment of the proposed residential zoning is unlikely to give rise to any noise constraint and associated reverse sensitivity effects on activities in the GBZ.

2.0 The proposal

The PPC Site is currently zoned Special Purpose - Major Recreation Facility Zone (**SPZ**) and is subject to the Pukekohe Park Precinct controls in Chapter I434 of the AUP. The operative Pukekohe Park Precinct controls provide specific land use controls that enable the use and development of Pukekohe Park as a motorsports and horse racing facility.

The PPC proposes to modify the boundaries of the Precinct and to amend Chapter I434 of the AUP to remove motorsport as a permitted activity. The proposal is to continue to enable other permitted activities in the Pukekohe Park Precinct such as horse racing, indoor and outdoor events involving amplified music, and professional fireworks displays.

The PPC proposes to rezone the southern part of the Site to Residential – Mixed Housing Urban Zone (**RMHUZ**) and to include this land within a new Precinct, the Pukekohekohe Gateway Precinct. The proposed Residential Zone will enable the development of approximately 500 new residential dwellings.

The PPC also proposes to rezone the site containing the Watercare pumpstation (Designation 9569) within the LIZ and to rezone an area of land within the Open Space- Informal Recreation Zone (**OSIRZ**).

Figure 1 illustrates the proposed zoning arrangements across the PPC Site and identifies:

- The area of the Site to be retained in the SPZ
- The proposed RMHUZ zoning across the Pukekohekohe Gateway Precinct. This land is located to the south of the SPZ and is adjacent to KiwiRail's designated rail corridor for the NIMT.
- The proposed LIZ zoning applying to the site occupied by a wastewater pumpstation on Buckland Road.

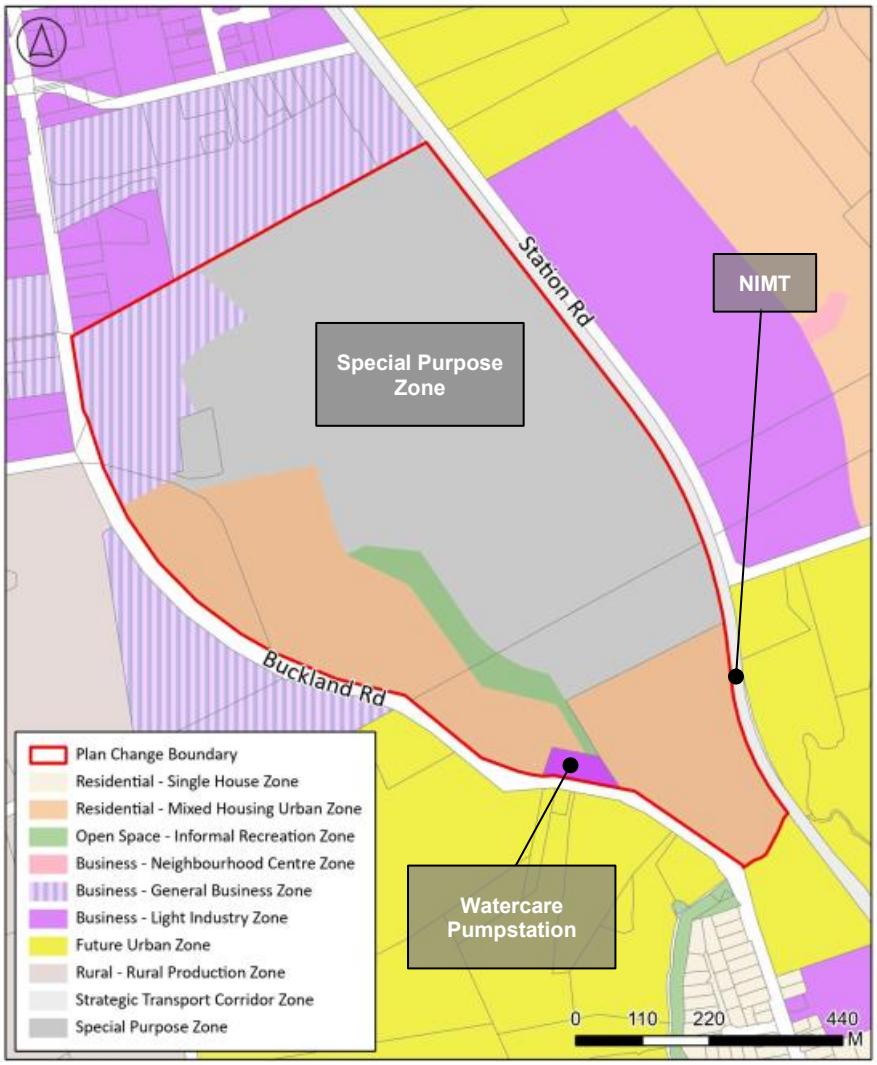

Figure 1: Proposed zoning arrangements

3.0 Assessment of land transport noise effects

Exposure to high noise levels from rail and road traffic has the potential to result in adverse effects on the occupants of dwellings established nearby. It is well established internationally and within New Zealand that it is appropriate to ensure that land surrounding noisy transport infrastructure is developed in a way that mitigates the noise levels to reasonable levels indoors to avoid the worst of these effects.

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 this, we are aware of and have been involved in[3] the development of several

[3] For example, the Waihoehoe Precinct, Wellsford Plan Change 92 and Pilkington Park Plan Change 101 standards https://www.aucklandcouncil.govt.nz/UnitaryPlanDocuments/pc-50-precinct-provisions.pdf

recent precinct chapters that include controls to manage noise effects from rail and road 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. There should be no reverse sensitivity effects on the rail or road operator if the precinct standards ensure that effects generated from the rail or road corridor will be reasonable for adjacent land use activities.

3.1 The proposed precinct controls to manage rail noise effects from the NIMT

We have worked with the Project Team in consultation with KiwiRail to develop precinct standards to manage rail noise effects inside buildings containing ASN within the Pukekohekohe Gateway Precinct.

The proposed precinct controls are based on KiwiRail's Policy, with modifications to take into account the potential noise effects generated from this part of the network. The proposed precinct controls are also based on the development of recent controls to manage rail noise effects on AUP precincts that anticipate and provide for ASN[4].

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 typically 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".*

In this case, KiwiRail have advised that the maximum number of trains that could pass this Site in one hour should be three, not two as is common on other parts of the KiwiRail network. We understand that this reflects the additional demand for freight trains on this section of the network. This means that the level of railway noise referred to in the precinct standard should be deemed to be 72 dB $L_{Aeq(1hr)}$ at a distance of 12m.

The proposed precinct standard specifies a clear pathway to determining the rail noise levels across the site and allows for compliance with the permitted activity standard to be confirmed by a Suitably Qualified and Experienced Acoustic Consultant with the building consent application. The proposed standard allows for the rail noise levels and the façade design to be confirmed through rail noise modelling.

The KiwiRail Policy requires noise sensitive rooms to be provided with mechanical ventilation and cooling (in circumstances where windows and doors must be closed to achieve the indoor noise levels). The proposed precinct standards for mechanical ventilation and cooling have

[4] Including Wellsford Plan Change 92.

been adapted from recent AUP precinct standards for residential zones exposed to noise from rail corridors[5] The proposed precinct controls for rail noise are described further below.

3.1.1 Residential dwelling design for rail noise

The proposed precinct standard will require the acoustic treatment of any building containing ASN within 100m of the NIMT within Sub-Precinct B to ensure that buildings are designed, constructed and maintained to reduce external noise to not exceed 35 dB $L_{Aeq(1\ hour)}$ in bedrooms and sleeping areas, and 40 dB $L_{Aeq(1\ hour)}$ for all other Noise Sensitive Spaces.

The maximum outside to inside noise reduction (**NR**) required for any new building (or alteration to an existing building) that contains a Noise Sensitive Space to achieve[6] the internal noise levels will be:

- 35 dB within bedrooms and sleeping areas; and
- 30 dB in all other Noise Sensitive Spaces.

These noise level reductions are considerable. We expect that rooms facing the NIMT at the minimum setback distance will require heavy glazing, relatively small, glazed areas (as a proportion of the facades), heavy cladding, (e.g. brick, masonry) and solid core doors if they face the NIMT.

The extent of acoustic treatment to achieve the specified internal noise levels is dependent on a number of factors including facade elements, size of windows, room layout, volume and reverberation in the interior spaces. Once the designs for the residential lots have been completed, a more detailed assessment of each dwelling should be undertaken so that the sound insulation requirements are the most efficient possible to avoid over-specification. For example, the facade of the dwelling facing away from the railway will likely require less treatment as it is less exposed than the closest facade, and dwellings that are screened from the railway by other buildings or fencing will be less exposed to the noise from the railway.

The requirements could be reduced at some facades by using acoustically effective screening. To be acoustically effective, the screening would need to block line of sight between the noise source and receiving façade. For example, 2.5 m high screening would effectively reduce noise levels at a ground floor façade but not an upper storey façade. As detailed below, the Precinct provisions require a 2m high acoustically effective barrier along the common boundary between the proposed Precinct and the rail corridor.

Overall, we expect that the acoustic treatment measures for dwellings near to the minimum setback from the NIMT will be considerable. The degree of effort will reduce as the distance from the NIMT increases.

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[5] Wellsford Plan Change 92.

[6] Based on the proposed precinct standards and required 5m setback, the noise from the railway line at the boundary of the closest residential lot 5m setback will be approximately 70 dB $L_{Aeq(1hour)}$.

3.1.1.1 Proposed precinct standard for mechanical cooling and ventilation

The mechanical ventilation and cooling system specifications set out in the proposed precinct standard require the installation of a mechanical ventilation system that will achieve the following requirements (emphasis added) where external windows must be closed to achieve the specified internal design levels:

(a) Provides mechanical ventilation that can operate continuously to satisfy clause G4 of the New Zealand Building Code and that provides at least 1 air change per hour, but no less than 7.5L/s per occupant; and

(b) Provides cooling and heating that is controllable by the occupant and can maintain the inside temperature between 18°C and 25°C when assessed using a 2.5% design weather condition for Pukekohe. An acceptable design weather set would include IRHACE Yearbook 2009 NIWA weather data; and

(c) Any system installed in compliance with IX.6.7(1)(a) and (b) above, must not generate more than 35 dB LAeq(30s) when measured 1 metre away from any grille or diffuser. The noise level must be measured after the system has cooled the rooms to the temperatures in IX.6.7(1)(b), or after a period of 30 minutes from the commencement of cooling (whichever is the lesser);

OR:

(d) Alternatively, in lieu of section IX.6.7(1)(a) - (c) above, a design verified by a suitably qualified and experienced HVAC expert stating the design proposed will provide ventilation and internal space temperatures to meet or exceed the outcomes described in IX.6.7(1)(a)-(c).

These specifications are designed to provide occupants with adequate ventilation, heating, cooling when external windows are closed to reduce rail noise. These specifications are the outcome of acoustics and HVAC experts working together on several recent plan review processes to design a set of plan-based performance standards for mechanical ventilation and cooling systems that are suitable for occupants of homes in high noise environments. The specifications have been refined with input from KiwiRail and Waka Kotahi.

The proposed precinct standards are generally consistent with those adopted for Wellsford North and several other plan changes across New Zealand.

3.1.2 Additional precinct controls to mitigate rail noise

As set out above, we understand that there are more freight movements on this section of the line than there are on other sections of the network. We have worked with the Project Team to incorporate two additional noise (and vibration) mitigation measures to assist in managing the effects:

1) Requiring a 2m high acoustically effective barrier along the common boundary between the proposed Precinct and the rail corridor. This will help to reduce the noise of the rolling stock on the ground floor spaces and rear yards of the lots closest to the rail corridor.

2) Ensuring that no habitable rooms are constructed within 5m of the designated rail boundary. This will result in a setback from the nearest rail track of approximately 15-

20m. This will assist in managing the acoustic treatment efforts and costs and will assist in reducing vibration effects on people.

3.1.3 Rail vibration

The proposal is to manage potential rail vibration through a proposed Vibration Alert Layer. The proposed Vibration Alert Layer is designed to "warn" potential occupiers of the Precinct that they may experience vibration effects from rail pass-bys. The alert provides an expectation that vibration effects may be experienced and enables any occupier to "*make their own design and location decision should they wish to mitigate such effects*"[7]. The description of the Pukekohekohe Gateway Precinct identifies that areas of the Precinct that are within 60m of the NIMT may experience vibration levels higher than would normally be experienced.

The use of a Vibration Alert Layer is consistent with the way that vibration is being managed in other Precincts in Auckland and in recent District Plan provisions around New Zealand. The inclusion of a Vibration Alert Layer is also consistent with the approach set out in KiwiRail's Standard Reverse Sensitivity Provisions and Section 32 Report (emphasis added):

> *"…, the exact design requirements to ensure compliance with appropriate vibration levels depend significantly on site-specific factors, including ground condition / soil type, topography or other environmental features. The level of controls required and the associated cost of implementing such controls can therefore differ significantly on a site-to-site basis.*
>
> *Without further research into the requirements and cost of implementing such controls on a district-wide basis, there is insufficient existing data to confirm appropriate district-wide provisions which require physical controls for vibration.*
>
> *"For this reason, KiwiRail has instead pursued a "Rail Vibration Alert Layer" be added to the District Plan maps. Such alert layers ensure landowners and occupiers are aware that vibration effects may be present in this location (100m from the rail corridor). They can then make their own design and location decisions should they wish to mitigate such effects. This enables behaviour change and appropriate notice to landowners, while avoiding uncertain costs of controls at this time".*

The inclusion of a Vibration Alert Layer overlay is consistent with decisions on recent plan changes across Auckland (i.e. the Wellsford North Precinct). We understand that KiwiRail agree with the alert-layer approach in this case.

3.2 The proposed precinct standard to manage road traffic noise effects from Manukau and Buckland Road

We have used DGMR iNoise computer noise modelling software to predict the future road-traffic noise levels from Manukau and Buckland Road across the Precinct. The road-traffic noise modelling has been used to inform the development of a precinct standard to manage

[7] From page 14 of KiwiRail's *Standard Reverse Sensitivity Provisions and Section 32 Report*:

road-traffic noise effects inside buildings containing ASN within the Pukekohekohe Gateway Precinct.

The road-traffic noise modelling has been used to determine the nominal distance[8] (i.e. distance from the road corridor) that should be referred to in the precinct controls requiring acoustic treatment for road-traffic noise.

The proposed precinct standard incorporates Auckland Transport's[9] recommendations for the precinct standard to reflect a nominal road traffic noise effects area[10] that is based on the "likely ultimate environment", which includes:

- A speed limit of 60km/hr
- A road surface with asphalt/smooth concrete; and
- The acoustic screening that will be provided from future built development adjacent to the road corridor.

The road-traffic noise modelling inputs are set out below.

Table 1: Noise model input parameters

Parameters/calculation settings	Inputs
Software	DGMR iNoise
Calculation method	CRTN and ISO9613
Meteorological parameters	Single value, C0 = 0 (downwind in all directions away from the road)
Ground attenuation over land outside road corridor	General method, ground factor: 0.6
Air temperature	293.15 K
Atmospheric pressure	101.33k Pa
Air humidity	60%
Source heights (relative)	0.5m
Receiver heights (relative)	7m (allowing for potential three-story development in all zones that may contain ASN) in accordance with indicative masterplan layout

[8] Auckland Transport expressed their preference for a nominal, standardised distance from the road corridor rather than relying on the undulating 57dB $L_{Aeq24hr)}$ noise level contour to form the outer extent of the road-traffic noise effects area.

[9] Following the Clause 23 RFI.

[10] Auckland Transport expressed their preference (through the Clause 23 process) for the road traffic noise effects area referred to in the precinct standard to be based on a standard nominal distance from the road corridor, rather than applying the 57dB $L_{Aeq(24h)}$ contour as the control line.

Parameters/calculation settings	Inputs
Road surfaces:	Asphalt
Speed environment	Scenario 3: 60km/hr
AADT vehicle counts (from CKL)	13,100, of which 12% are HCV Future AADT is based on this plan change, PC87 and PC30 having been made operative.
Corridor alignment	Existing alignment.

The noise modelling was used to identify the location of the 57dB $L_{Aeq(24h)}$ road traffic noise contour across the Site.

We then overlaid the 40m, 55m and 70m lines (from the road centreline) across the conceptual lot masterplan to determine which nominal distance will align best with the modelled contour and best manage noise levels at future dwellings predicted to receive road traffic noise levels greater than 57dB $L_{Aeq(24h)}$.

Our analysis of the three options confirmed that it not possible to nominate a standard nominal distance that captures all dwellings exposed to road traffic noise levels greater than 57dB $L_{Aeq(24h)}$ without excluding some dwellings or capturing a large number of additional dwellings unnecessarily. For example, the 60m option would capture 55 dwellings unnecessarily, and the 40m option would miss 12 dwellings exposed to road traffic noise levels greater than 57dB $L_{Aeq(24hr)}$.

Our analysis found that a precinct standard requiring the acoustic treatment of future dwellings within 55m from the road centreline will be efficient and reasonable to manage road-traffic noise effects. The 55m control will ensure that the first row of dwellings adjacent to the road corridor will be acoustically treated from road traffic noise to deliver occupants with an acceptable level of internal amenity. Our analysis of the 55m control found that the dwellings that might be outside the 55m setback and exposed to noise levels greater than 57dB $L_{Aeq(24hr)}$ are likely to be very few and only exceeding by 1-2dB and probably only on one façade. The internal noise level difference for dwellings exposed to external road-traffic noise levels of 57dB $L_{Aeq(24hr)}$ and 59dB $L_{Aeq(24hr)}$ is very small and on one façade only.

Appendix B includes a plan showing the 57dB $L_{Aeq(24hr)}$ contour across the Precinct and the 55m line (from the road centreline) overlaid across the indicative masterplan.

3.2.1 The proposed precinct standard to manage road-traffic noise

The proposed Precinct provisions include a permitted activity standard that will require future buildings containing ASN within 55m from the centreline of Buckland/ Manukau Road to be acoustically treated so that road traffic noise from Manukau Road and Buckland Road does not exceed 40 dB $L_{Aeq\ (24\ hour)}$ in all Noise Sensitive Spaces.

The precinct standard requires the provision of a mechanical ventilation and cooling system where external windows must be closed to achieve the specified internal noise level. The proposed mechanical ventilation and cooling system requirements are the same as the specifications described in Section 3.1.1.1.

4.0 Compatibility with adjacent zoning arrangements

4.1 Noise from activities at Pukekohe Park

The PPC seeks to delete the motorsport noise standards in the Pukekohe Park Precinct (Chapter I434 of the AUP) as motorsport is no longer a feature at the Park.

We understand that horse racing and other events are to remain and that the underlying Special Purpose- Major Recreation Facility Zone will be retained over the area of the site that will remain within the Pukekohe Park Precinct.

The proposed deletion of the motorsport activities and associated noise standards will remove any allowance in the existing Pukekohe Park Precinct controls for any special noise events in the Precinct. The only noise standards remaining would be the standard AUP controls of 55dB L_{Aeq} during the daytime and 45dB L_{Aeq} at night. These are modest controls for day-to-day activities that would not generally allow for any special events or the use of the existing fixed public address system for horse racing.

We understand that the applicant wishes to retain the ability to hold special events for horse racing and other events, so some special noise event standards will be required.

We were heavily involved with the development of the Major Recreation Facility Zone and the noise standards for all of the Major Recreation Facility Precincts across Auckland in the AUP process. This included the development of a series of bespoke and generic special event noise controls for each precinct.

The bespoke noise standards were generally developed where a precinct already had a resource consent or other specific legacy plan provisions that were tailored to the particular venue. Examples include motorsports events at Western Springs and Pukekohe Park, and concerts at North Harbour Stadium. Other precincts had more generic provisions applied such as at Ellerslie and Avondale racecourses.

We consider that the precinct provisions developed for Special Noise Events from the Ellerslie Racecourse Precinct form a good basis for developing standards for the activities that we understand will be undertaken at Pukekohe Park. We have worked with the Project Team to develop noise standards that enable a range of special noise events but at a much lesser level of noise effects on nearby residential zones than the motorsport noise standards that are proposed to be deleted.

We recommend that the precinct noise standards are complied with when measured within the boundary of any site containing ASN in a Residential Zone or notional boundary of any site in a Rural Zone. This approach will control noise levels received at residential sites within the

Pukekohekohe Gateway Precinct and dwellings in the Future Urban Zones adjacent to the Site.

The noise during special events will be dominant throughout the residential environment on days when the events are held. Amplified voice and music would be clearly audible and dominant for the duration that the events are held. However, this is common in Auckland and most of New Zealand for receivers living near to major stadiums and venues and near to any land that is used for Temporary activities. For context, the Temporary Event provisions in Chapter E40 of the AUP allow a higher level of noise effects than the proposed precinct controls and can be undertaken anywhere in Auckland. The proposed controls for this SPZ are therefore typical when compared to the provisions applying to other major stadia and facilities in Auckland.

We consider that the proposed special event controls will ensure that the noise effects on all existing and future receivers will be reasonable.

4.1.1 Noise measurements of Pukekohe Park activities

We have undertaken a series of noise measurements to ensure that the non-motorsport noise events typically undertaken at Pukekohe Park will comply with the proposed precinct controls, which are in general accordance with other Special Purpose – Major Recreation Facility Zones and including the Ellerslie Racecourse Precinct provisions.

Styles Group undertook noise measurements of a horseracing event at Pukekohe Park on Sunday 23 February 2025. 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 approximately 62m west of the speakers, just within the area of the Site to be included within the proposed Residential Zone.

The measured level from the public address (**PA**) system was 62 dB $L_{Aeq\ (5\ min)}$ at 62 m. Based on the indicative masterplan, we expect that the location of the speakers for the PA system may change with the proposed racecourse facility upgrade.

The following distances between the speakers and the nearest notional boundary would need to be observed for the PA system to comply with the proposed precinct standards:

- 13 m for compliance with 75 dB $L_{Aeq\ (5\ min)}$
- 42 m for compliance with 65 dB $L_{Aeq\ (5\ min)}$

We understand that it will be readily achievable for the existing PA system and any future PA system to be designed and operated in a way that will comply with the proposed precinct standards for day-to-day activities and special noise events.

4.2 Assessment of noise effects from the GBZ

The adjacent land at 301 and 303 Buckland Road was recently rezoned from Future Urban Zone (**FUZ**) to GBZ as part of Private Plan Change 87. We understand that the consented

activities on the GBZ include a warehouse and distribution centre on 301 Buckland Road (the **Franklin's Depot**) and industrial storage yard[11] on 303 Buckland Road.

We have assessed the potential for reverse sensitivity effects on activities in the GBZ by reviewing the existing compliance locations for noise and the approved resource consent plans for the warehouse and distribution centre (the **Franklin's Depot**) on 301 Buckland Road.

4.2.1 The legally existing noise environment

The land surrounding the GBZ is zoned Rural Production Zone (**RPZ**), FUZ and Special Purpose Zone (**SPZ**) under the current zoning arrangements.

The permitted noise standards in Chapter E25 control the maximum permitted noise levels generated and received within the same zone, whilst requiring compliance with interface noise limits that control the noise levels received at the notional boundary of any dwelling in a Rural Zone or within the boundary of a Residential Zone. Under the operative zoning arrangements there are no residential zones in proximity to the GBZ, however the FUZ contains dwellings. The notional boundaries of these FUZ dwellings therefore control the maximum potential noise emissions from the GBZ.

The operative zoning arrangements allow noise levels of up to 65 dB L_{Aeq} to be generated and received between sites in the GBZ[12], provided that noise levels from the GBZ do not exceed 55 dB L_{Aeq} (daytime) and 45 dB L_{Aeq} (daytime)[13] when measured and assessed at the notional boundary of any dwelling in a rural/ FUZ zone. The FUZ dwelling on 323 Buckland Road represents the closest existing compliance location for noise from the GBZ. The notional boundary of the dwelling is approximately 20m from the southern boundary of the GBZ.

Our analysis finds that the industrial storage yard on 303 Buckland Road is currently constrained by the requirement to comply with Standard E25.6.19 at the notional boundary of the closest dwelling on 323 Buckland Road. We therefore consider that the introduction of the proposed Residential Zone will not introduce any new noise constraint on GBZ activities on 303 Buckland Road.

However, we note that the proposed Franklin's Depot (301 Buckland Road) is separated from the existing FUZ dwelling by a much greater distance and will not be controlled by this compliance location as 303 Buckland Road is. We have therefore undertaken noise modelling to determine any potential noise constraint on the operation of the Franklin's Depot arising from the proposal.

[11] https://www.aucklandcouncil.govt.nz/UnitaryPlanDocuments/pc-87-attachment-3(ii)-303-buckland-road-consent-granted.pdf and https://www.aucklandcouncil.govt.nz/UnitaryPlanDocuments/pc-87-attachment-3(i)-301-buckland-road-consent-granted.pdf

[12] Standard E25.6.6

[13] Standard E25.6.19. This standard also includes low frequency controls at night.

4.2.1.1 Assessment of potential constraint arising from the Plan Change on the Franklin's Depot

The proposed residential zoning on the Site will require noise levels from the GBZ to comply with the noise levels in Standard E25.6.19 at the boundary of the proposed Residential Zone. At its closest point, the proposed Residential Zone will be approximately 20m from the GBZ (separated by Buckland Road).

The site plan for the Franklin's Depot (reproduced below) shows that the majority of high noise generating activities are consolidated to the rear of the site, behind the proposed showroom and warehouse building.

Future dwellings within the proposed Residential Zone will be most exposed to noise generating activities from freight handling activities that may occur during the night time period in the "Second Forecourt" (circled red) in Figure 2.

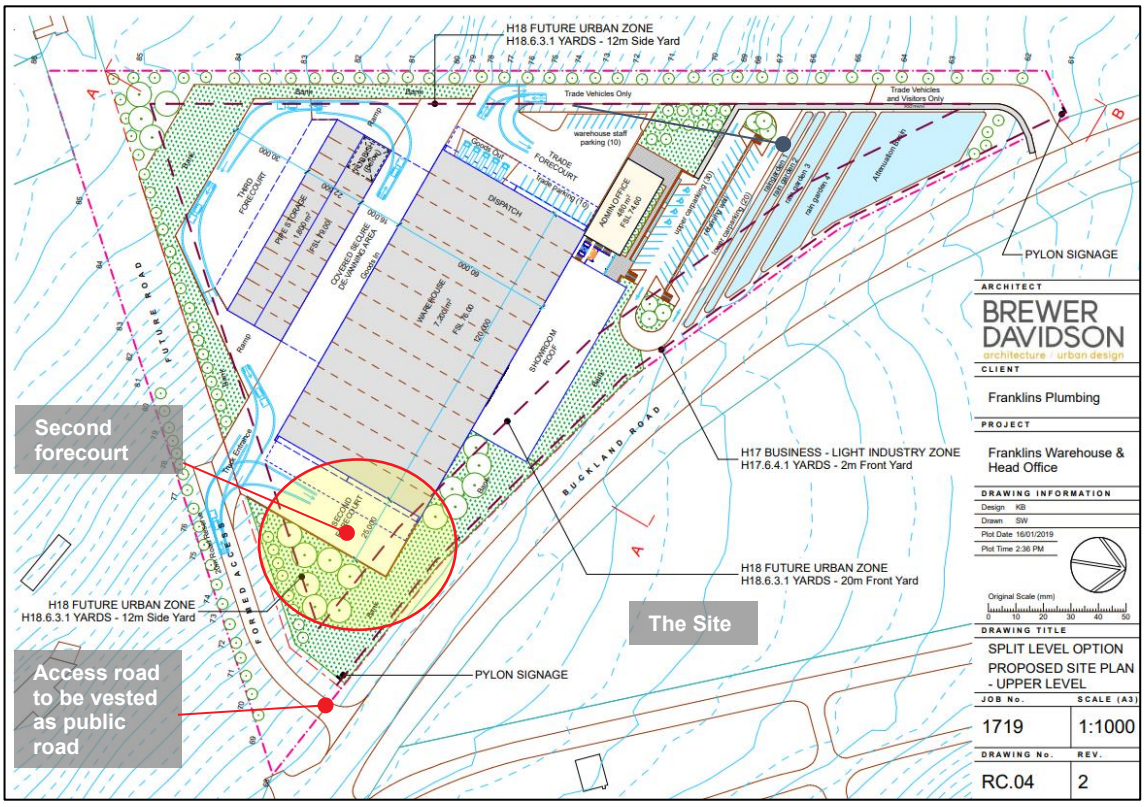


Figure 2 Approved site plan for 301 Buckland Road

We have used DGMR iNoise computer noise modelling software to predict the noise levels generated from activities in the Second Forecourt and received at the boundary of the proposed Residential Zone.

We prepared the noise model using the ground levels and layout shown in the consented development plans. The noise model represents the worst-case noise levels over a 15 minute timeframe in the night time period, whereby:

- A large truck and trailer enters the second forecourt from the access that will be vested as a public road[14].
- A diesel forklift[15] operates continuously (i.e. 100% on time) to load/ unload the truck.
- The truck exits the site.

The noise model therefore represents up to two truck movements in 15 minutes (8 per hour) with continuous forklift noise during the night time period. Figure 3 displays an excerpt from the computer noise model.

The noise level predictions from the second forecourt demonstrate that the activity can comply with the maximum permitted noise levels prescribed by Standard E25.6.19 during all prescribed timeframes when measured and assessed within any future residential lot within the Site. The noise level predictions demonstrate that the daytime noise levels will be complied with by a significant margin.

The noise modelling we have undertaken indicates that the risk of potential noise constraint arising on the GBZ is low.

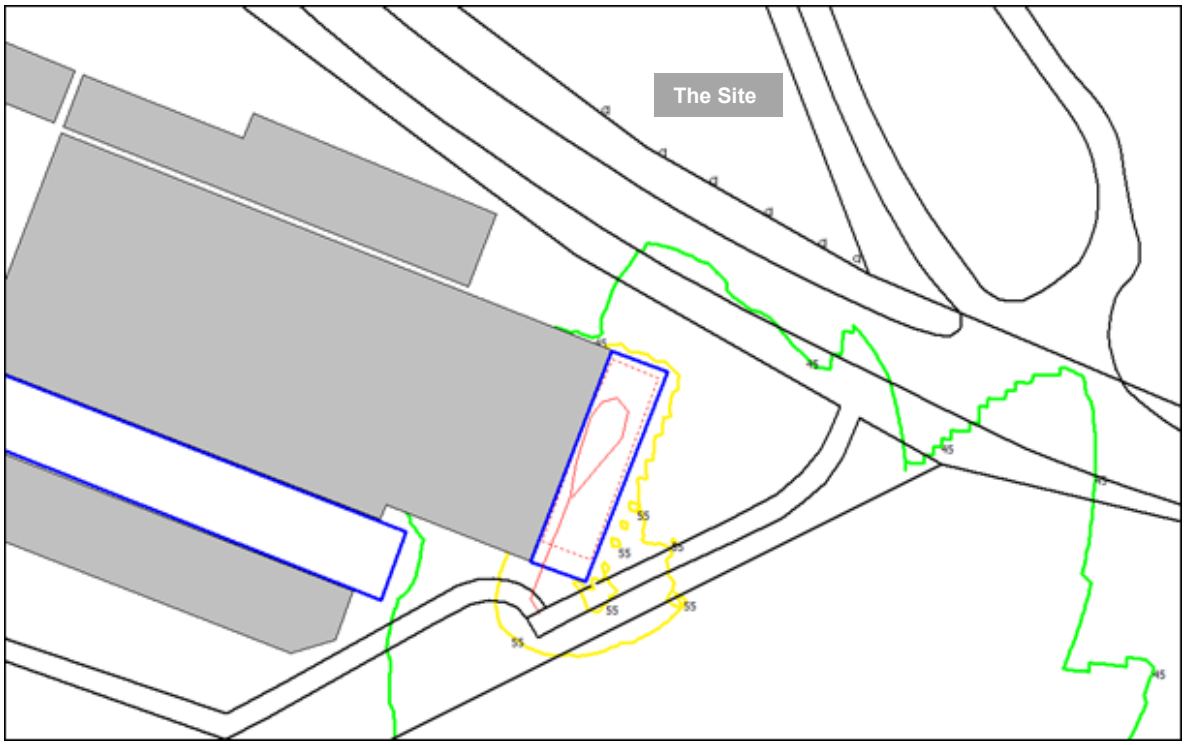


Figure 3 Noise model for diesel forklift operating in second forecourt on 301 Buckland Road

Assumptions: 2 x truck movements in 15 minutes (8 per hour)- 79 dB LAE at 15m, 1 x forklift 93 dB SWL (area source) and 100% on-time.

[14] Chapter E25 does not control noise from vehicles operating on public roads.

[15] The noise model assumes the forklift will operate with a broadband reverse alarm.

4.3 Assessment of noise effects from the proposed LIZ

The PPC proposes to rezone the site occupied by the Watercare wastewater pumpstation within the LIZ. The boundaries of the LIZ site will interface with the proposed RMHUZ and Pukekohekohe Gateway Precinct. Figure 4 displays the proposed zoning arrangements in relation to the pumpstation.

We have assessed the potential for reverse sensitivity effects on Watercare Services' pumpstation (Designation 9569[16]) by reviewing the permitted noise standards to manage noise generated from the LIZ. We have also undertaken noise measurements of the pumpstation and reviewed the future compliance locations for noise.

4.3.1 Permitted noise standards between the LIZ and Residential Zones

Noise levels generated from the LIZ and received in a Residential Zone are controlled by Standard E25.6.19 of the AUP. Standard E25.6.19 *Business Zones interface* requires all activities in Business Zones to achieve compliance with the following noise levels when measured and assessed at the boundary of a site in a Residential Zone:

Table E25.6.19.1 Noise levels at the business zone interface

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 pumpstation is currently required to comply with the same numerical noise limits at the existing notional boundary of the dwelling on 353 Buckland Road (approximately 18m away from the boundary of the pumpstation). We consider that this existing compliance requirement will result in similar or lower noise emissions in the proposed Residential Zone of the Pukekohekohe Gateway Precinct.

4.3.2 Noise measurement results

We have also assessed the potential for reverse sensitivity effects on the pumpstation by undertaking noise measurements.

Styles Group deployed a sound level meter on the location shown on Figure 4 between 22 and 24 July 2025.

[16] No conditions relating to operational noise are attached to the designation.

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. All measurement and assessment of the data has been undertaken in accordance with the relevant sections of NZS6801:2008 and NZS6802:2008. The meteorological conditions during the measurement period were calm.

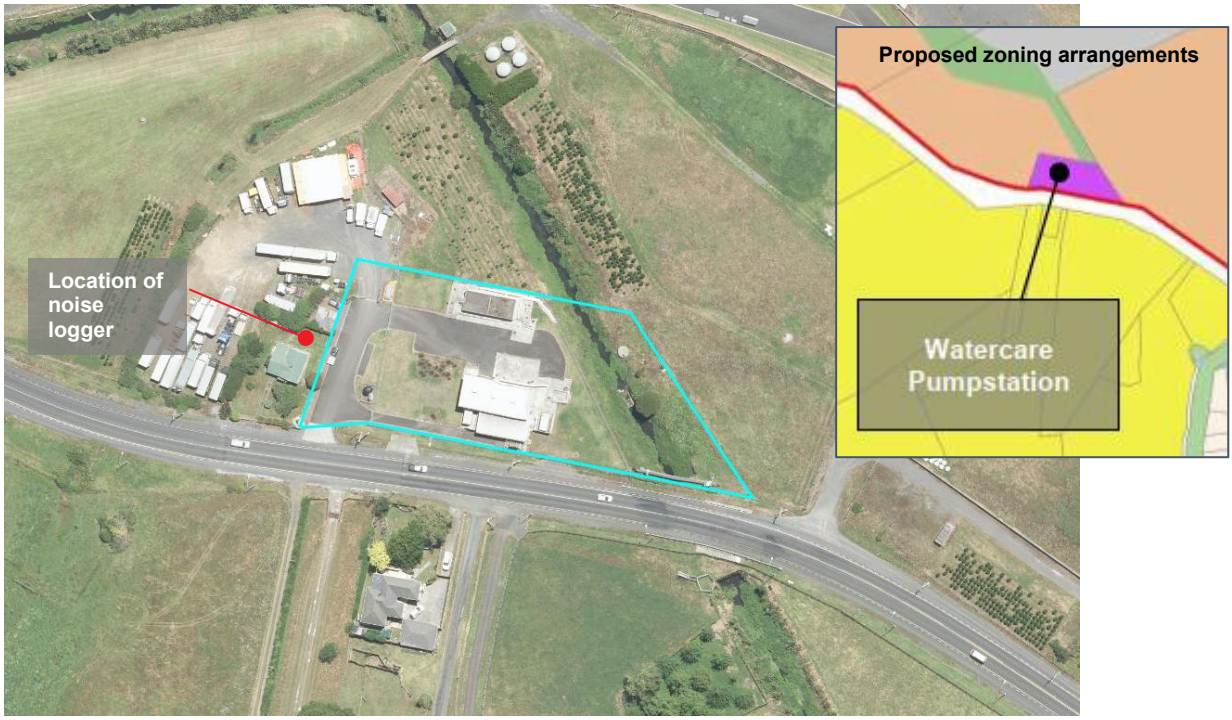


Figure 4 Noise measurements - Watercare pumpstation

We analysed the noise measurements to determine whether operational noise from the pumpstation is likely to give rise to annoyance or complaint at future residential lots that may be enabled by the plan change.

Our analysis of the noise measurements in Appendix C finds that:

- The L_{Aeq} data is controlled by traffic on Buckland Road and cannot be used to determine the noise from the pumpstation with certainty. Instead, we have analysed the L_{A90}, L_{A95} and L_{A99} to determine the contribution of the constant pump station noise. Our observation on site is that the noise from the pumpstation is steady and very constant, and the L_{Aeq} noise level will be within a decibel or so of the statistical measures we have assessed (when all other residual noise sources are removed).
- The closest dwellings in the proposed Residential Zone will be exposed to noise levels that are well below the permitted night time noise limit. The measured noise levels were consistently below 40 dB L_{Aeq} and generally around 35dB L_{Aeq}.
- The noise measurements show that the pump station does not exhibit any tonal characteristics that would require an adjustment for special audible character.

4.3.3 Overall findings

We have not identified the need for any specific precinct controls to achieve land use compatibility between the LIZ and residential activity in the Pukekohekohe Gateway Precinct. We consider that the permitted noise levels in Standard E25.6.19 will deliver an acceptable level of amenity for the adjacent residential receivers in the Pukekohekohe Gateway Precinct. The noise measurements demonstrate that the operational noise levels from the pumpstation can readily comply with these noise limits at any future residential lot.

5.0 Summary

Styles Group has assessed the potential noise effects from the proposal to rezone land within the Pukekohe Park Precinct. We have assessed the actual and potential noise effects from the adjacent transport corridors (road and rail) and zoning arrangements to determine compatibility with future ASN within the proposed Pukekohekohe Gateway Precinct.

We have worked with the Project Team to develop precinct controls that are designed to deliver the following outcomes:

i. Require noise sensitive spaces adjacent to the NIMT and arterial road corridors to be designed, constructed and maintained to deliver an adequate level of internal noise amenity, and to require mechanical ventilation and cooling where the internal noise levels can only be achieved if windows and doors are kept closed to reduce rail or road traffic noise. The proposed precinct controls are consistent with recent precinct controls developed for other AUP precincts exposed to noise from land transport corridors.

ii. Use a Vibration Alert Area to identify that areas of the Pukekohekohe Gateway Precinct that are within 60m of the NIMT railway corridor may experience vibration levels higher than would normally be experienced. We understand that KiwiRail support the use of the proposed Vibration Alert Area.

iii. Require the construction of a 2m high acoustically effective barrier along the common boundary between the proposed Precinct and the rail corridor and ensure no habitable rooms are constructed within 5m of the designated rail boundary. These measures will assist to mitigate noise effects for the lots closest to the rail corridor.

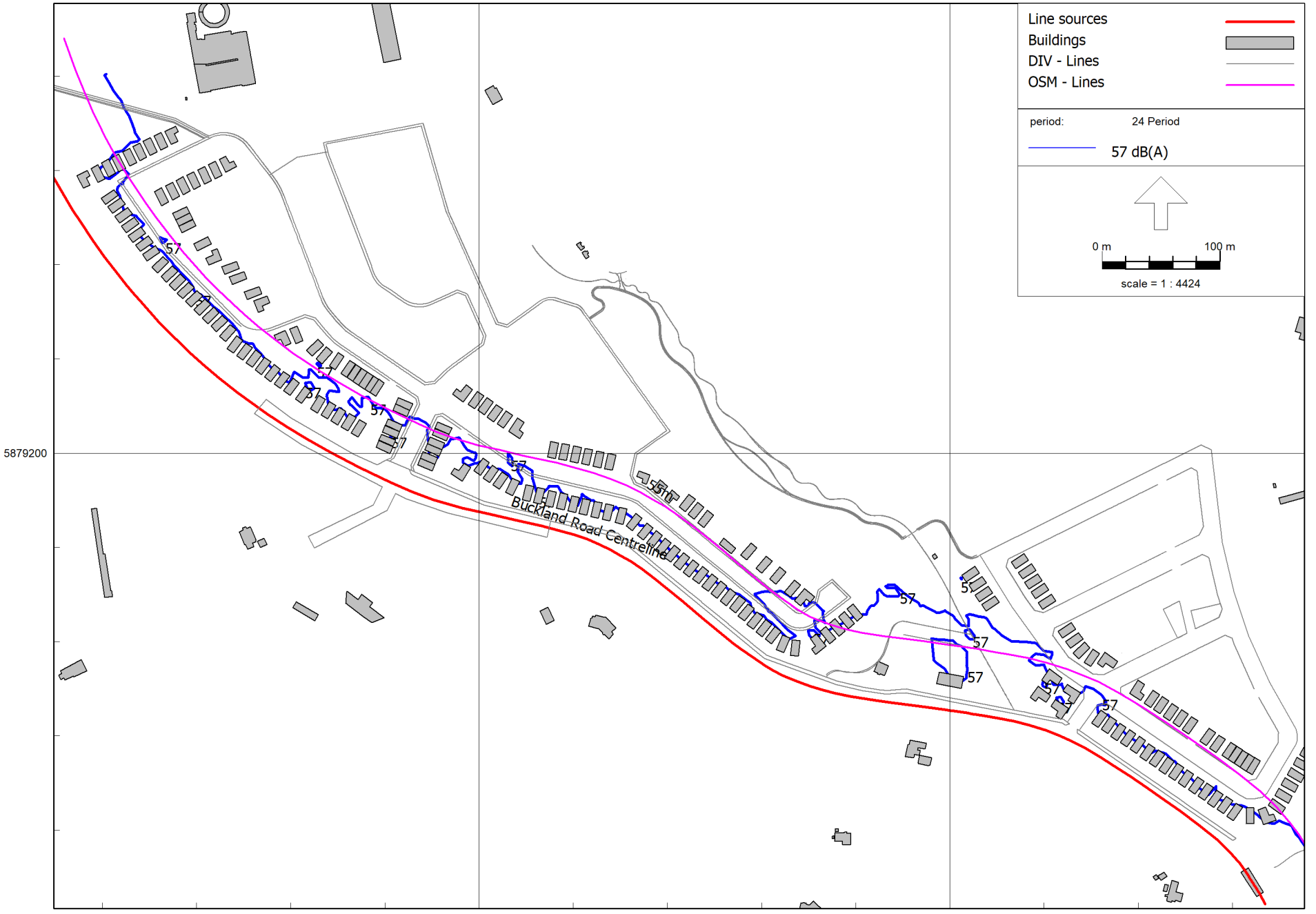
iv. Amend Chapter I434 of the AUP to remove high levels of motorsport noise as a permitted activity inside the Pukekohe Park Precinct, while including appropriate (and much lower) noise standards to enable special event noise from ongoing and future Pukekohe Park Activities (such as horse racing, indoor and outdoor events involving amplified music, and professional fireworks displays). The noise standards are designed to ensure that special event noise levels will be reasonable for the existing and proposed ASN surrounding the Pukekohe Park Precinct.

We consider that the proposed Precinct controls will ensure that the noise effects generated from the rail and road corridors and ongoing activities in the Pukekohe Park Precinct will be reasonable for the future ASN within the proposed Pukekohekohe Gateway Precinct.

Appendix A Glossary

Noise	A sound which serves little or no purpose for the exposed persons and is commonly described as ‘unwanted sound’. The definition of noise includes vibration under the Resource Management Act 1991.
dB (decibel)	The basic measurement unit of sound. The logarithmic unit used to describe the ratio between the measured sound pressure level and a reference level of 20 micropascals (0 dB).
A-weighting	A frequency filter applied to the full audio range (20 Hz to 20 kHz) to approximate the response of the human ear at lower sound pressure levels.
$L_{Aeq(t)}$ (dB)	The A-weighted equivalent sound pressure level with the same energy content as the measured varying acoustic signal over a sample period (t). The preferred metric for sound levels that vary over time because it considers the total sound energy over the time period of interest.
L_{AFmax} (dB)	The maximum A-weighted sound pressure level recorded during the measurement period using a fast time-weighting response.
Noise Rating Level	A noise level derived in accordance with NZS 6802:2008 for comparison with a limit.
Notional boundary	A line 20 metres from any side of a residential unit or other building used for a noise sensitive activity, or the legal boundary where this is closer to such a building.
PPV (mm/s)	Peak particle velocity is the metric commonly used for measuring construction vibration in New Zealand. It is the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.

Appendix B Plan showing 57dB $L_{Aeq(24h)}$ road traffic noise contour and the 55m line (measured from centreline of Buckland Road)



ISO 9613-2:2024, [version of Area - 13,100AADT; 12%HVT; 60km/h_noise contours at 1.5m_with houses_asphalt 10] , iNoise V2024.3 Enterprise Licensed to Styles Group Acoustics and Vibration - New Zealand

13,100AADT; 12%HVT; 60km/h_noise contours at 1.5m_with houses_asphalt 10 - Styles Group Acoustics and Vibration - New Zealand
55m setback

Appendix C Watercare noise measurement results