Styles Group
Acoustics & Vibration Consultants

ASSESSMENT OF NOISE EFFECTS

LIVE NATIONAL FESTIVAL
254–276C HOOKER ROAD, TAMAHERE

PREPARED FOR

Live Nation Entertainment Ltd.

DATE

6 November 2026

Assessment of noise effects prepared by Styles Group for Live Nation Entertainment Ltd.

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Executive summary

Styles Group has assessed the noise effects from the Live Nation Festival, a music and camping event to be held annually between 28 December and 1 January at 254-276C Hooker Road over a five-year consent term (the **Event**). This assessment has been prepared to accompany a resource consent application and Assessment of Environmental Effects (**AEE**) for the proposal.

Styles Group have used noise modelling software to predict the level of amplified sound generated from the Event and received at occupiers of adjacent sites. Noise modelling has been undertaken to predict the potential noise effects on long-tailed bats and to inform the Project Ecologist's assessment of noise effects.

We have assessed the noise effects on receivers exposed to noise from the Event in accordance with the permitted noise standards prescribed by the Waikato District Plan Operative in Part (**WDPOP**).

The WDPOP does not prescribe specific noise standards to enable temporary events and requires noise levels to be assessed in accordance with the noise standards for the underlying zone. The Event requires resource consent as a discretionary to exceed the noise limits prescribed by NOISE-R8 at receivers in the General Rural Zone and Rural Lifestyle Zone.

The noise limits in NOISE-R8 are designed to control the noise from permanent land use activities and are not designed for a temporary event that will generate short-term noise effects.

The Event will be held in the Waikato District. Event noise will be received in the Waikato and Waipā Districts. The WDPOP does not control the level of noise received in the Waipā District, however our assessment finds that the Waipā District Plan anticipates and provide for a similar level of noise amenity as the WDPOP. The assessment of noise effects is therefore relevant to receivers in both jurisdictions.

Our assessment finds that amplified sound from the Event will generate short-term noise effects typical of a large-scale music event. People's sensitivity to Event noise will vary according to the activities they are undertaking and the background sound levels at these times. The effects will range from being inaudible to audible, through to dominant and high enough to disturb sleep.

We have worked with the Project Team to develop a comprehensive framework of conditions of consent to ensure the level, timing and duration of amplified sound from the Event will be proactively controlled to achieve compliance with the proposed noise limits.

1.0 Introduction

Live Nation Entertainment Ltd. has engaged Styles Group to predict and assess the noise effects from the Live Nation Festival (the **Event**) to be held annually at 254–276C Hooker Road, Tamahere (the **Site**) over a five-year consent term.

This report provides an assessment of the noise effects from the Event, including:

i. Noise level predictions of amplified sound generated from the Event

ii. An assessment of the Event noise levels and effects in accordance with the permitted noise standards prescribed by the Waikato District Plan Operative in Part (**WDPOP**) and relevant New Zealand acoustics standards

iii. A summary of the noise modelling that has been undertaken to inform the Project Ecologist's assessment of the potential noise effects on long-tailed bats

iv. Recommended noise management measures and conditions of consent.

Our assessment is based on our understanding of the proposal following a site visit and discussions with the Project Team.

This report should be read in conjunction with the application site plans and the Assessment of Environmental Effects. A glossary of acoustical terms used within this document is attached as Appendix A.

2.0 The Event

The proposal is to hold an annual music and camping festival on the Site for up to 35,000 people per day, of which up to 18,000 people will be camping on the Site.[1]

The Event will include live and amplified music across five stages between 28 December and the early morning of 1 January. The Event stages will operate from 1400 each day, with the last stage(s) concluding amplified sound no later than:

- 0100 on 29 December:
- 0230 on 30 and 31 December
- 0330 on 1 January.

Event stages will not operate during the daytime on 1 January. All campers will vacate the Site by 1 January.

No fireworks displays are proposed[2].

[1] The 28 December event day is limited to 18,000 camping patrons only.

[2] This includes traditional fireworks with an air-burst component. Stage pyrotechnics may be used, but these are not loud like traditional fireworks.

Construction of infrastructure and structures associated with the Event will commence from 15 November. Dismantling and removal of structures and site reinstatement will be complete by 15 January.

Figure 1 displays the Event layout, including stage locations.

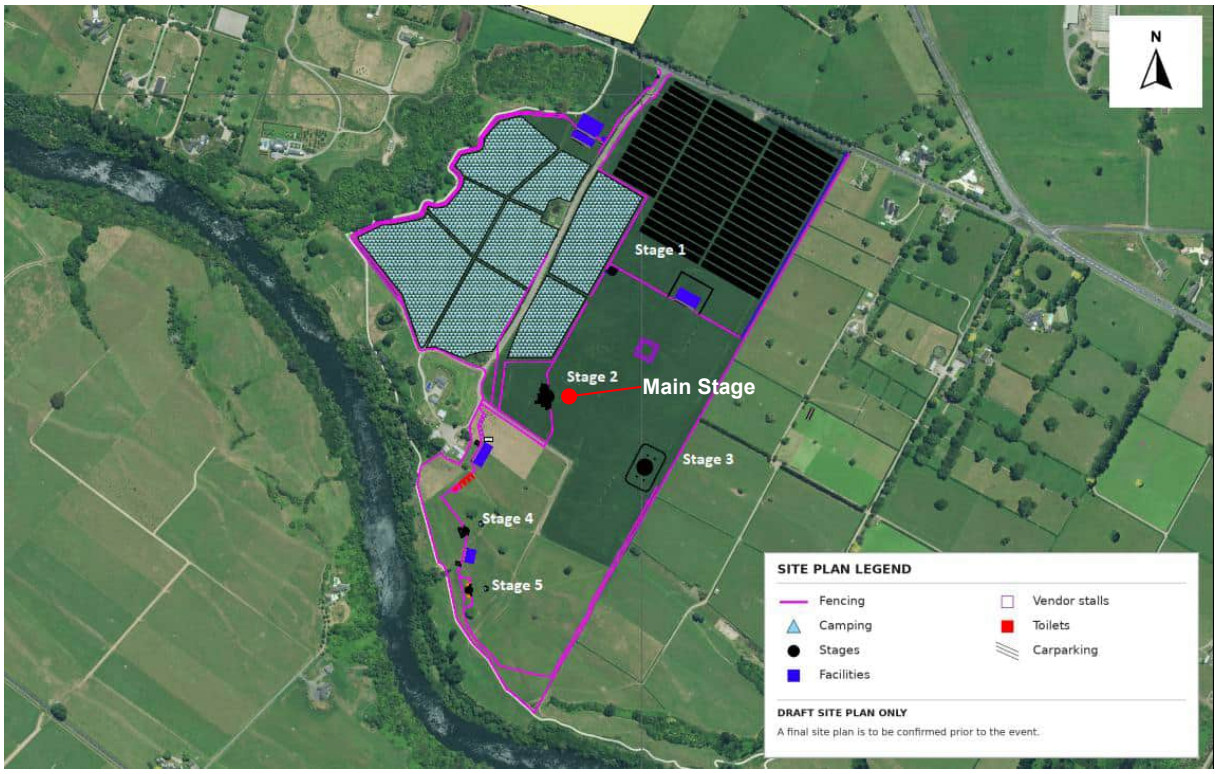


Figure 1 The Event layout

3.0 The Site and surrounding environment

The Site and surrounding sites are in the General Rural Zone (**GRUZ**) of the WDPOP.

The adjacent land on the southern side of the Waikato River is in the Rural Zone of the Waipā District.

The surrounding land use on both sides of the Waikato River is generally characterised by productive and rural lifestyle lots, occupied by scattered residential dwellings. The receiving environment also includes barn/ cottage visitor accommodation and equestrian facilities.

The Event will be held during the school holiday period. Educational facilities have not been identified as potential receivers.

The Site is approximately 650m from the Waikato Expressway (**WEX**). Road-traffic noise from the WEX forms part of the noise environment.

4.0 Permitted noise standards

We have assessed the noise effects from the Event in accordance with the permitted noise standards prescribed by the WDPOP.

4.1 Temporary Event Rules

TEMP-R5 of the WDPOP permits a *Temporary Event*[3] in the GRUZ where it complies with the following standards:

(a) The event occurs no more than 6 times per consecutive 12 month period;

(b) The duration of each event is less than 72 hours;

(c) It may operate between 7.30am to 8:30pm Monday to Sunday;

(d) Temporary structures are:

  (i) erected no more than 2 days before the event occurs;

  (ii) removed no more than 3 days after the end of the event;

(e) The site is returned to its previous condition no more than 3 days after the end of the event;

(f) There is no direct site access from a national route or regional arterial road

TEMP-R5 does not include any permitted noise standards for a temporary event in the GRUZ. Policy TEMP-P2(b) requires noise from temporary events to be assessed in accordance with the permitted noise standards for the underlying zone. These noise limits are designed to manage operational noise levels from permanent activities that generate noise effects on a day to day basis.

The relevant zone noise limits are set out below.

4.2 The WDPOP Zone noise limits

The noise level contours in Appendix B illustrate the spatial propagation of noise levels from the Event (in the GRUZ) across the adjacent zoning arrangements. The noise level contours show that the receivers exposed to Event noise levels greater than 40 dB $L_{Aeq(5min)}$ are in the GRUZ and Rural Lifestyle Zone (**RLZ**).

4.2.1 The GRUZ noise limits

NOISE-R8 prescribes permitted noise levels to control the operational noise levels between sites in the GRUZ (and other zones).

[3] Defined by the WDPOP to mean *"a social, cultural or recreational event. It includes entertainment events, carnivals, festivals, fairs, markets, or exhibitions, and associated temporary buildings or car parks".*

NOISE-R8 requires compliance with the following noise limits when measured and assessed at the notional boundary of any other site in the GRUZ:[4]

i. 50dB L_{Aeq}, 7:00am to 7:00pm every day;

ii. 45dB L_{Aeq}, 7:00pm to 10:00pm every day;

iii. 40dB L_{Aeq} and 65dB L_{Amax}, 10:00pm to 7:00am the following day.

NOISE-R8 requires noise levels to be measured and assessed in accordance with the New Zealand Standards NZS 6801:2008 *Acoustics – Measurement of environmental sound* and NZS 6802:2008 *Acoustics – Environmental noise*.

4.2.2 Noise limits from the GRUZ to the RLZ

NOISE-R8(b) also controls noise generated from the GRUZ and received in any other zone.

NOISE-R8(b) requires that noise levels from activities in the GRUZ must meet the permitted noise levels for the receiving zone (in this case the RLZ).

NOISE-R11 sets noise limits between sites in the RLZ. These are the same as the noise limits that apply between sites in the GRUZ.

Therefore, the permitted noise standards for activities in the GRUZ and received in the GRUZ and RLZ are the same. They are set out in Section 4.2.1 above.

4.2.3 Reasons for consent

The proposal requires resource consent as a discretionary activity to exceed the permitted noise limits prescribed by NOISE-R8 at receivers in the GRUZ and RLZ of the WDPOP.

4.3 Construction noise from pack in and pack out

The term “pack in and pack out” includes all delivery of equipment, construction of the necessary infrastructure, security fencing, staging, production infrastructure, temporary toilet and food and beverage facilities, post-event deconstruction, loading and removal of all Event related infrastructure.

Construction of infrastructure and structures associated with the Event will commence from 15 November. Dismantling and removal of structures and site reinstatement will conclude by 15 January.

Noise from pack-in and pack out activities is defined as construction work and assessed in accordance with NOISE-R4.

[4] The WDPOP defines “notional boundary” as “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”.

NOISE-R4 requires that construction noise levels are managed in accordance with the recommended numerical limits set out in NZS 6803:1999 '*Acoustics – Construction Noise'* (**NZS6803**).

NZS6803 provides guideline noise limits that are based on the duration of construction works at any one location, and the occupation of the receiving site. The proposal is to comply with NZS6803's recommended construction noise limits for a "typical duration" project when measured and assessed 1m from the facade at all occupied dwellings on adjacent sites.[5]

The relevant noise limits for construction work are:

- 75 dB L_{Aeq} and 90 L_{AFmax} between 07:30 and 18:00 Monday to Saturday
- 55 dB L_{Aeq} and 85 L_{AFmax} between 07:30 and 18:00 on Sundays and Public Holidays
- 60 dB L_{Aeq} and 75 L_{AFmax} between 06:30 and 07:30 on Weekdays
- 45 dB L_{Aeq} and 75 L_{AFmax} between 20:00 and 06:30 on Weekdays and Saturdays
- 45 dB L_{Aeq} and 75 L_{AFmax} between 18:00 Sunday evening and 06:30 on Monday morning.

4.4 Event noise received in the Waipā District

The Site is near to the territorial boundary of the Waipā District. Event noise will be received in the Waikato and Waipā Districts.

The WDPOP does not control the level of noise received in the Waipā District. However, the Waipā District Plan (**WDP**) rules are relevant to understand the level of noise that could be reasonably anticipated by the receivers in the Waipā District. These are provided for context and to inform the assessment of noise effects.

The noise level contours in Appendix B show that receivers in the following WDP zones will be exposed to Event noise levels greater than 40 dB $L_{Aeq(5min)}$:

- The Rural Zone
- The Medium Density Residential Zone
- The St Peters College Zone. We understand the college will be closed for education or boarding during the Event.
- The Mystery Creek Events Zone. This zone anticipates and provides for major events but also includes residential dwellings.
- The Industrial Zone. This zone is not identified as being sensitive to noise.

[5] The duration of construction work associated with the Event meets the definition of a "typical duration project" being a construction project that is more than 14 calendar days but less than 20 weeks.

4.4.1 The WDP Temporary Event Rule

Rule 4.4.2.53 of the WDP permits Temporary Events[6] for up to 500 attendees on any site[7] up to two times per calendar year, where the event is held between the hours of 7:00am and 10:00pm. The level of amplified sound from an outdoor concert is not limited where it complies with the relevant standards for scale, duration and timing.

While the proposed Event does not comply with the WDP controls for a permitted Temporary Event, it is relevant to note that the WDP anticipates and providing for up to two consecutive days (15 hours per day) of amplified sound from a permitted Temporary Event with no noise limits.

4.4.2 The WDP permitted noise limits in the Rural Zone and MDRZ

Rule 4.4.2.15 of the WDP permits noise generating activities in the Rural Zone where the noise levels at any notional boundary do not exceed 50dB L_{Aeq} during the daytime (between 7:00am and 10:00pm) and 40dB L_{Aeq} and 70 dB $L_{AF(max)}$ during the nighttime (between 10:00pm and 7:00am).

Rule 2A.4.2.41 of the WDP sets numerical noise limits consistent with the above for noise generated and received inside the MDRZ, except the noise limits apply at the site boundary.

The noise limits applying in the WDP Rural Zone and MDRZ are the same as the noise limits that apply in the WDPOP Rural Zone and RLZ, except the nighttime L_{Amax} limit is 5dB higher. Given the consistency of the permitted noise limits across all noise sensitive receivers, we consider that the receivers in the WDP have a similar expectation for night time noise amenity as receivers in the WDPOP. The assessment of noise effects provided in Section 7.0 is therefore relevant to receivers in both jurisdictions.

4.4.3 Construction noise from pack-in and pack-out

Rule 4.4.2.19 of the WDP permits construction noise where it complies with the limits recommended in New Zealand Standard NZS 6803:1999 *Acoustics – Construction noise*. This rule permits the same level of construction noise effects as NOISE-R4 of the WDPOP.

5.0 Event noise modelling and predictions

Styles Group has used DGMR iNoise V2026 noise modelling software to prepare noise level predictions of the amplified sound levels from the Events, based on the International Standard ISO 9613-1/2. This software is globally recognised and has been successfully implemented on a large number of projects throughout New Zealand.

[6] Defined by the WDPOP as "an ACTIVITY involving people engaged in recreational, leisure or meetings or similar pursuits either as participants or spectators and includes sports events, public meetings, carnivals, concerts, craft or trade fairs, displays, and filming, but excludes CUSTOMARY ACTIVITIES."

[7] Where the site is within 500m of a Residential Zone, Medium Density Residential Zone, or Large Lot Residential Zone boundary.

The calculations assume meteorological conditions that slightly enhance propagation in all directions in accordance with NZS 6801:2008. The computer noise model is three-dimensional and takes into account the topography, buildings, ground coverage, attributes and location of the event sound sources and receivers. Topographical contour data has been obtained from LINZ and event specifications have been provided by the Project Team.

The input parameters for the noise model are shown in Table 1.

Table 1: Noise model input parameters

Parameters/calculation settings	Details
Software	DGMR iNoise V2026
Calculation method	ISO 9613.1/2
Meteorological parameters	Single value, C0 = 0
Ground attenuation	General method, ground factor 1.0
Air temperature	293.15K
Atmospheric pressure	101.33kPa
Air humidity	60%
Source heights (relative)	Main stage (line array): 8 - 12m
Source noise level at 30 m	Stage 1 - 95 dB $L_{Aeq(5min)}$ Stage 2 - 96 dB $L_{Aeq(5min)}$ Stage 3 - 102 dB $L_{Aeq(5min)}$ Stage 4 - 98 dB $L_{Aeq(5min)}$ Stage 5 - 98 dB $L_{Aeq(5min)}$
Receiver heights (relative)	1.5m above ground level

The frequency content of the sound sources has been calibrated in each frequency band according to measurements we have conducted at Front of House[8] (**FoH**) for many large music events. The frequency spectrum in the noise models are divided up between the sources, with subwoofers near the ground handling the majority of the low frequency production and the elevated line arrays and delay arrays handling mid-bass through to the higher frequencies. We have created our noise models using the polar plots of the arrays and subwoofer arrangements that are likely to be used along venue-specific noise modelling provided to us by the production team and from the many measurements we have completed at other large events.

[8] FoH is typically where the sound engineers / product crew are located on a platform that is 30m from the stage.

5.1 Modelled scenarios

We have prepared Event noise models to represent the following scenarios:

i. **5 Stages Model**: The noise model for this scenario assumes that all five stages are operating at their maximum noise limits, simultaneously. We expect that although this is possible, it is extremely unlikely to occur in practice. This noise model is essentially a worst-case scenario, whereby the main stage (Stage 2 on the Site Plan) is the main noise generator.

The 5 Stages Event noise model is based on the timeframes set out in Table 3 below.

Table 2 Stage timing

Night	Stages open	Last stage(s) close
28/29 December	1400	0100 29 December
29/30 December	1400	0230 on 30 December
30/31 December	1400	0230 31 December
31 December / 1 January	1400	0330 1 January

ii. **Late Night Model: Single Stage on Nights of 29/30 December and 30/31 December**: The proposed conditions stipulate that only one stage can operate between the period of 0100 and 0230 on the nights of 29 and 30 December. The noise level contours for this scenario represent the noise effects from Stage 2 between 0100 and 0230. The noise contour for this scenario demonstrates that the 40 dB L_{Aeq} Event noise contour recedes significantly to the west of the Site when compared to the 5-stages model.

iii. **Late Night Model: Two Stages on Night of 31 December/1 January:** The proposed conditions stipulate that only two stages can operate between the period between 0100 and 0330. The noise level contour for this scenario represent the noise from Stage 2 and Stage 5 between 0100 and 0330. The noise contour for this scenario also demonstrates that the 40 dB L_{Aeq} Event noise contour recedes significantly to the northwest of the Site when compared to the 5-stages model.

5.2 Meteorological conditions

The noise modelling has been conducted based on the conservative algorithms in ISO9613 1/2. These specify that the predictions should be made assuming meteorological conditions that assist the propagation of noise in all directions away from the source. These conditions include:

1) a hypothetical situation where the wind is blowing from the Event and into the surrounding environment in all directions away from the Event, and

2) when there is a moderate temperature inversion present.

The modelled noise levels are therefore reasonably accurate when there is a moderate temperature inversion present and no wind anywhere along the propagation paths. Our experience is that such conditions can occur when wind speeds are very low or nil, but generally they are intermittent and infrequent. We consider that it is possible but unlikely that there will be no wind and a moderate temperature inversion during the Events that would see the noise level predictions realised in all directions away from the Event.

We consider that it is considerably more likely that there will be some level of wind blowing along the propagation paths for the majority of Events. The wind speed and direction will vary over each Event. In these circumstances, the Event noise level at receivers downwind of the Event will be up to approximately the modelled noise levels. The noise level upwind of the receivers is likely to be significantly lower than the modelled noise levels. The reduction will vary and may only be approximately -5dB at or around the 60dB L_{Aeq} contour, but could be up to -20dB or more at the 40dB L_{Aeq} contour.

6.0 Proposed noise mitigation and conditions

We have worked with the Project Team to develop a framework to mitigate the noise effects from the Event.

The following mitigation measures form part of the proposal. These measures form the basis of the recommended conditions of consent that are attached to the AEE.

6.1 Noise limits

We have recommended noise limits that apply at FoH, 30m in front of each Stage.

The use of short-term L_{Aeq} descriptor provides a tight control[9] and allows for the sound levels to be continually adjusted and managed by the consent holder throughout the event to maintain compliance. It is our experience that the level of effect generated by music noise is well controlled by a short-term L_{Aeq} limit.

No L_{AFmax} limit is proposed. Based on our experience of monitoring noise from similar events throughout New Zealand, the ability to undertake real-time control of the L_{Amax} noise levels is close to impossible due to the influence from external factors and the unpredictable and spontaneous way they can be generated by the live production. We consider that the short timeframe of the $L_{Aeq(5mins)}$ descriptor will provide a good degree of control over short-term intermittent high-noise sounds.

[9] Considerably tighter control than the $L_{Aeq(15min)}$ descriptor used in NOISE-R8

6.2 Noise monitoring

The objective of the noise monitoring is to ensure noise from each stage is proactively managed to achieve compliance with the proposed noise limits

This will be achieved through a real-time noise monitoring device at FoH of each stage.

The noise monitoring results will be updated in real time and visible to the FoH engineers responsible for controlling sound levels at the sound desk. This approach will allow the engineers to actively manage the sound levels to ensure compliance with the proposed noise limits.

6.3 Community liaison

In our experience, the most effective way to reduce annoyance and complaints from a temporary event is through effective communication to the community, primarily to let people know when the noise is going to be generated and for how long.

The Event will be highly publicised, and we expect the majority of receivers will have forewarning of the Event through publicity on social media channels, mainstream media and advertising.

There may be opportunities for the consent holder to engage with receivers through alternative channels such as a website, online community group forums, email or other forms of messaging. We recommend that the most appropriate communication channel or forum is determined in conjunction with Council.

7.0 Assessment of noise effects on the receivers

We understand that the applicant has consulted with the Tamahere community and has obtained letters of support from a number of parties. The sites from which support has been provided are identified on the noise level contours in Appendix B.

We understand the letters of support do not constitute an affected party approval. This assessment therefore considers the potential noise effects on all parties, including sites from which support has been provided.

We consider that amplified sound during sound checks and performances will generate short-term noise effects typical of a large-scale music event. Our experience is that some people will not be bothered by noise from the Event and some may enjoy it. Conversely, some people will be annoyed.

The nature and extent of these effects will depend on the time of day. For this assessment, daytime is 7am to 10pm, and nighttime is 10pm to 7am. People's sensitivity to Event noise will vary according to the activities they are undertaking and the background sound levels at these times. The noise level contours in Appendix B can be used to determine the predicted Event noise across adjacent sites.

During the day, traffic, commercial and recreational activities, and natural sounds generally contribute to higher background sound levels, making Event noise less noticeable. At night, many of these sounds reduce or cease. Event noise will therefore be more noticeable against the quieter background, when people are also more likely to be resting or sleeping.

7.1 Daytime noise effects

The noise effects that will be experienced during the daytime are summarised below.

- **60-70dB $L_{Aeq(5mins)}$** – The noise levels are expected to be dominant in the environment and will mask most other sounds except those that are loud themselves, such as construction work, busy roads or maintenance activities such as lawn mowing etc. The music and voice will be clearly intelligible. There is no risk of acute health effects (such as hearing loss) at these levels.
- **60-50dB $L_{Aeq(5mins)}$** – The noise levels are expected to be clear and audible and intelligible in areas where other noises (such as roads, industry etc) are low. Event noise will be clear and dominant in quiet areas away from roads and other noise sources.
- **50-40dB $L_{Aeq(5mins)}$** – Event noise is expected to be similar in level to other environmental sounds in the area. Near roads, businesses and other moderate or high noise sources, music and vocals will generally be difficult to distinguish, although the bass beat may remain audible. In quieter areas away from these sources, music and vocals may be more discernible, but the bass beat is still expected to dominate what people hear from the Event.

7.2 Nighttime noise effects

The noise effects that will be experienced during the nighttime are summarised below. The noise levels described are those predicted outdoors.

- **60-70dB $L_{Aeq(5mins)}$** – Where Event noise levels are 60 dB L_{Aeq} or higher, there is a high likelihood of sleep disturbance, even with windows closed. The bass beat is likely to be prominent inside these dwellings, and occupants may also clearly hear vocals and other instruments.
- **50-60dB $L_{Aeq(5mins)}$** – Occupants of well-insulated or modern properties with closed, double-glazed windows may sleep with minimal disturbance, although the bass beat is likely to remain clearly audible. Where windows are open for cooling or sound insulation is poorer, such as with single or lightweight glazing, sleep disturbance is likely, mainly from bass. Vocals and other instruments may occasionally be audible.
- **40-50dB $L_{Aeq(5mins)}$** – The bass beat is likely to be audible indoors at a low level. Some sleep disturbance is expected, although the extent will depend on each individual's sensitivity to the noise.

- **40dB $L_{Aeq(5mins)}$** – The Event will generally be inaudible or if it is audible it will be at a very low level. Audibility is expected to come and go as meteorological conditions across the propagation path vary. The bass beat is likely to be the most noticeable feature where it is audible.

7.2.1 Late night noise effects

The applicant has proposed conditions that will ensure that:

- No more than one stage operates between 0100 and 0230 on the nights of 29/30 December and 30/31 December
- No more than 2 stages operate between 0100 and 0330 on the night of 31 December/1 January.

This measure will significantly reduce the noise effects from the Event during the late night period.

The noise level contours in Appendix B for the late night periods demonstrate that the 40 dB $L_{Aeq(5min)}$ Event noise contour between 0100 and 0230 on Nights 2 and 3 and 0100 and 0330 on New Years Eve recedes significantly when compared to the 5-Stage noise level contours. The effects should be considered for these reduced areas.

7.3 Relevant objectives and policies

TEMP-P2 seeks to enable temporary events, while limiting noise to the permitted noise limits for the zone. NOISE-P1 seeks to minimise the adverse effects of noise on sensitive land uses by limiting the timing and duration of noise generating activities on noise sensitive activities.

It is generally accepted that temporary events involving amplified sound will not comply with noise limits of the zone. The zone noise limits are designed to control the noise effects of land use activities that generate noise effects on a permanent basis. Many District Plans therefore prescribe noise limits that are designed to enable elevated noise levels from amplified sound from temporary events, while ensuring the noise effects will be infrequent, short-term and intermittent.

The proposal will involve noise effects over a period of 4 consecutive days, once a year, over a consent term of 5-years. The noise effects will be temporary and will not form an ongoing feature of the noise environment.

8.0 Noise modelling to determine effects on Long-Tailed Bats

The Tamahere gullies are understood to be habitat to pekapeka-tou-roa, the New Zealand long-tailed bat (**Long-Tailed Bat**).

The Long-Tailed Bat is an echo-locating bat. It echo-locates during flight to find prey and navigate. The echo-location frequency is very high, and above the hearing range of humans.

Styles Group have undertaken noise modelling to assist the Project Noise Ecologist to determine the potential noise effects on Long-Tailed Bats.[10]

Appendix C sets out the methodology, inputs and assumptions that have informed the noise modelling. The Ecological Assessment should be referred to for a full understanding of the potential noise effects on Long-Tailed Bats.

9.0 Summary

Styles Group has assessed the potential noise effects of the Live Nation Festival, an annual event to be held between 28 December and 1 January over a 5-year consent term.

Amplified sound from the Event will exceed the permitted noise levels that apply in the GRUZ and RLZ of the WDPOP. However, the noise effects from the Event will be very short-term.

Our assessment finds that amplified sound from the Event will generate short-term noise effects typical of a large-scale music event. People's sensitivity to Event noise will vary according to the activities they are undertaking and the background sound levels at these times. The effects will range from being inaudible to audible, through to dominant and high enough to disturb sleep.

We have worked with the Project Team to prepare conditions that will deliver the following outcomes:

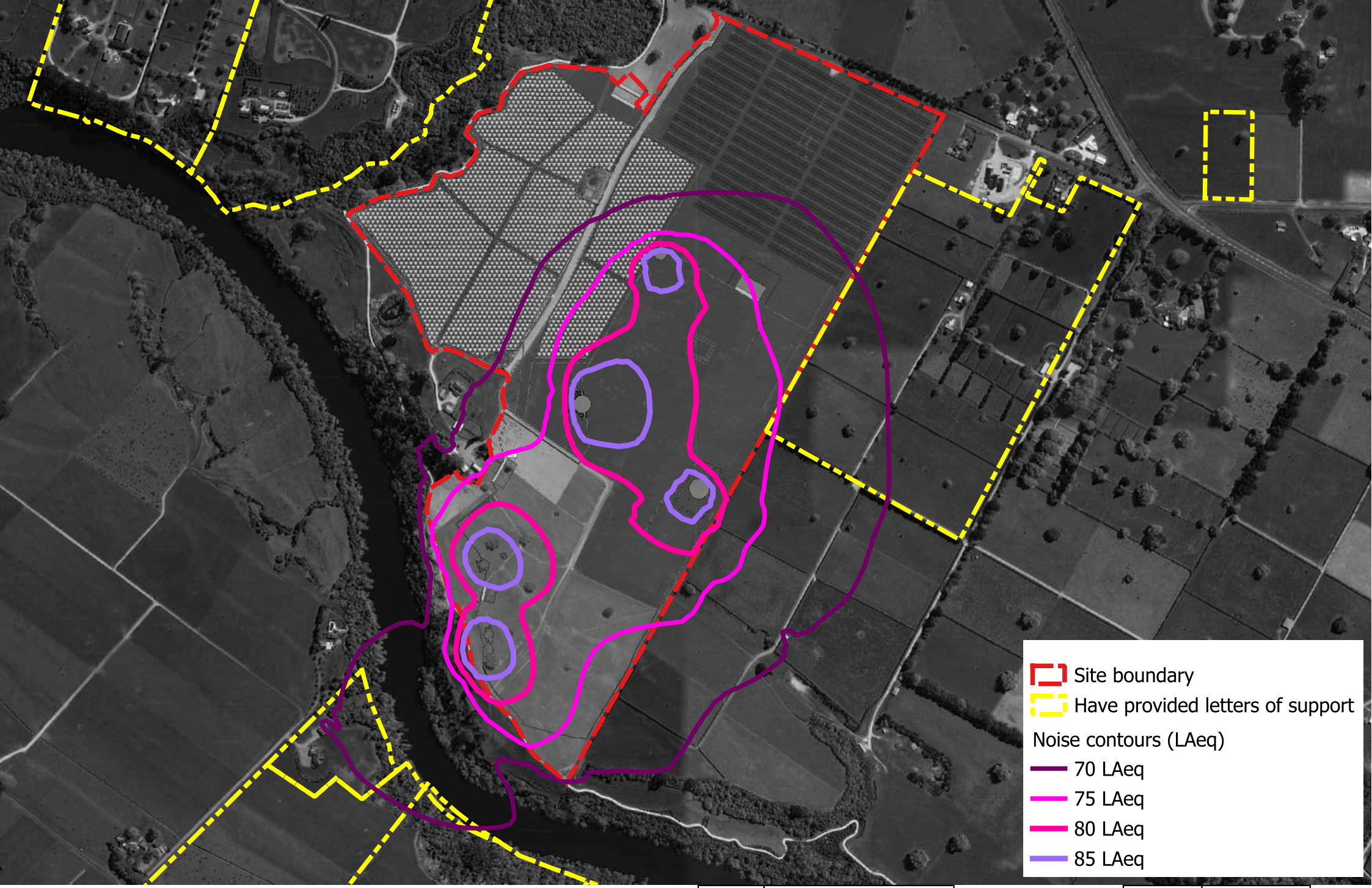
- Ensure the community exposed to Event noise is provided with advanced notice of the Event, to enable receivers to plan around potential disruption.
- Set the maximum noise limit that can be generated at FoH to ensure the noise levels from the Event are no greater than the levels predicted in this assessment.
- To require real-time noise monitoring throughout the Event to ensure that amplified sound is proactively managed at FoH to achieve compliance with the proposed noise limits.
- To ensure that the level and timing of noise from construction work complies with the permitted noise limits prescribed by the WDPOP.

[10] The District Plan does not include any noise limits that manage noise effects on bats. The noise limits set out in Section 4.0 are A-weighted noise limits that respond to the way that the human ear responds to noise.

Appendix A Glossary of terms

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.
Best practicable option	Defined in section 2 of the Resource Management Act as: in relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to— a. the nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and b. the financial implications, and the effects on the environment, of that option when compared with other options; and c. the current state of technical knowledge and the likelihood that the option can be successfully applied.
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.
Ambient noise	Ambient noise is the total of all noise within a given environment, comprising a composite of sounds from sources near and far.
$L_{Aeq(t)}$ (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 takes into account 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 derived noise level used for comparison with a noise 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.
NZS 6801:2008	N.Z. Standard NZS 6801:2008 Acoustics – Measurement of environmental sound.
NZS 6802:2008	N.Z. Standard NZS 6802:2008 Acoustics – Environmental noise.
NZS 6803:1999	N.Z. Standard NZS 6803:1999 Acoustics – Construction noise.
The Act	The Resource Management Act 1991.
s16	Section 16 of the Act states that "every occupier of land (including any premises and any coastal marine area), and every person carrying out an activity in, on, or under a water body or the coastal marine area, shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level".

Appendix B Predicted noise level contours

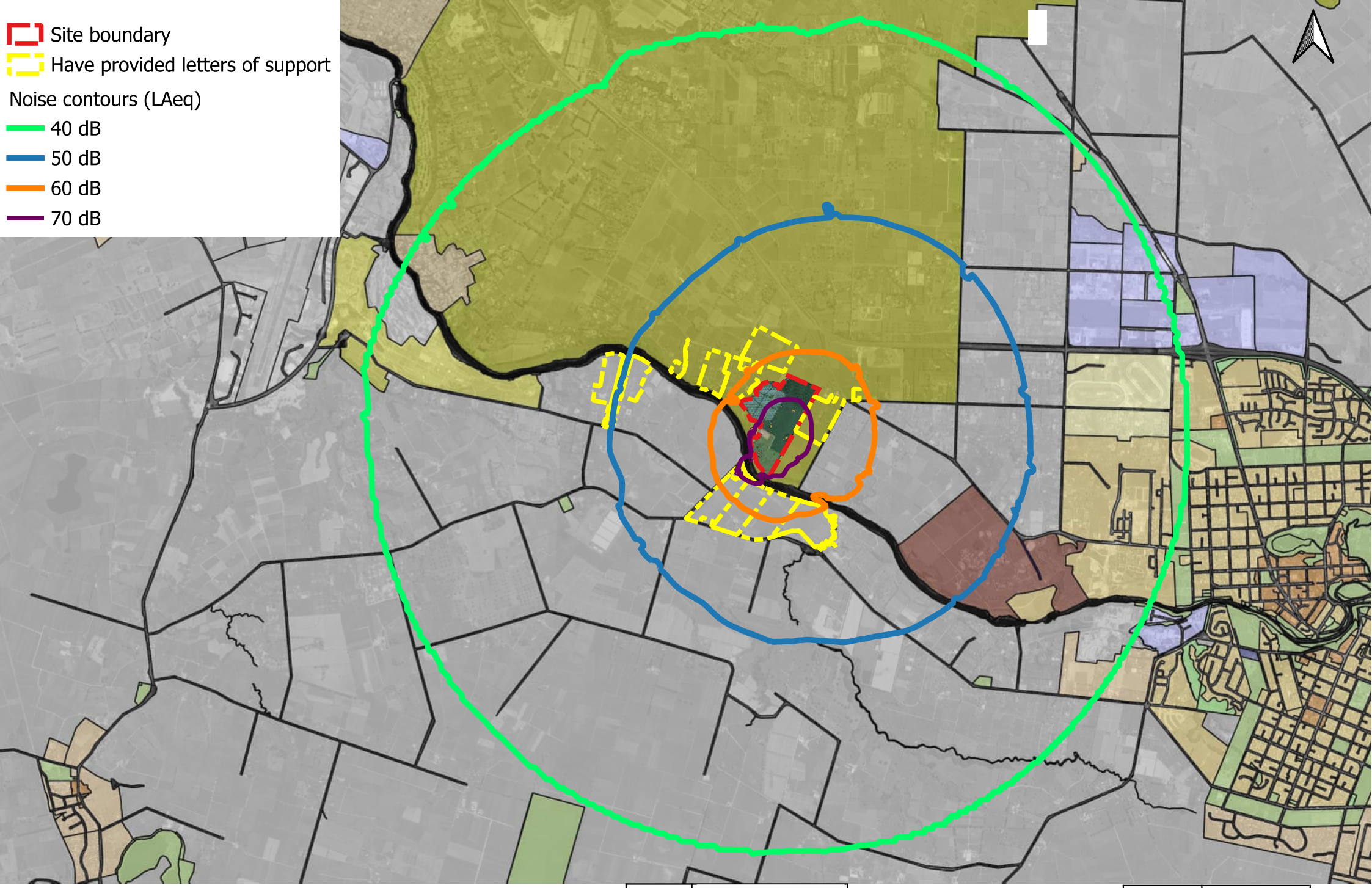


StylesGroup
Acoustics & Vibration Consultants

0 100 200 m

Title	Localised noise contours
Project	Live Nation 2027/28
Client	Live Nation

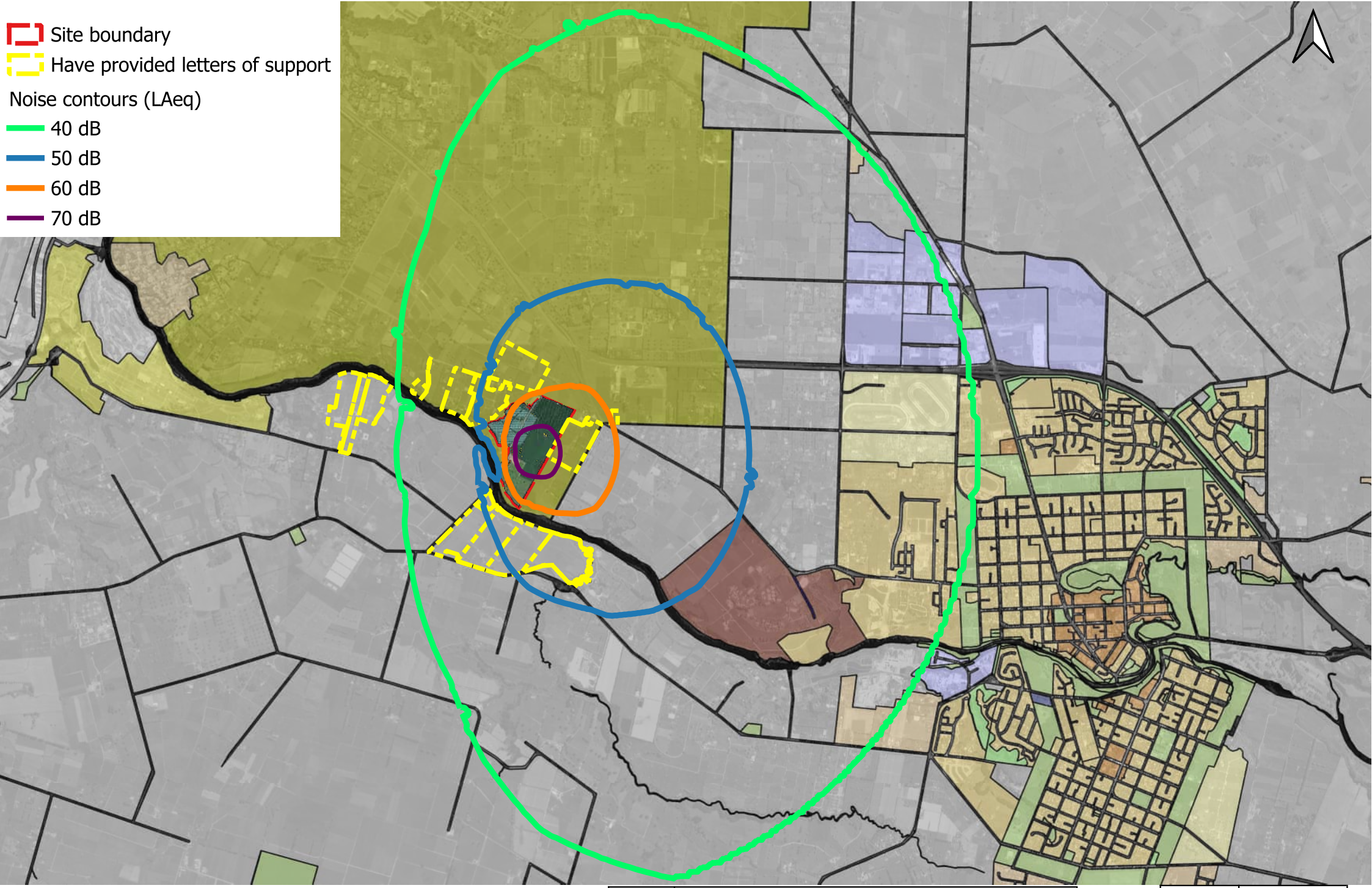
Date	05/11/26
Revision	V2
Author	M. Chambers



StylesGroup
Acoustics & Vibration Consultants

Title	5 Stages
Project	Live Nation 2027/28
Client	Live Nation

Date	05/11/26
Revision	V2
Author	M. Chambers

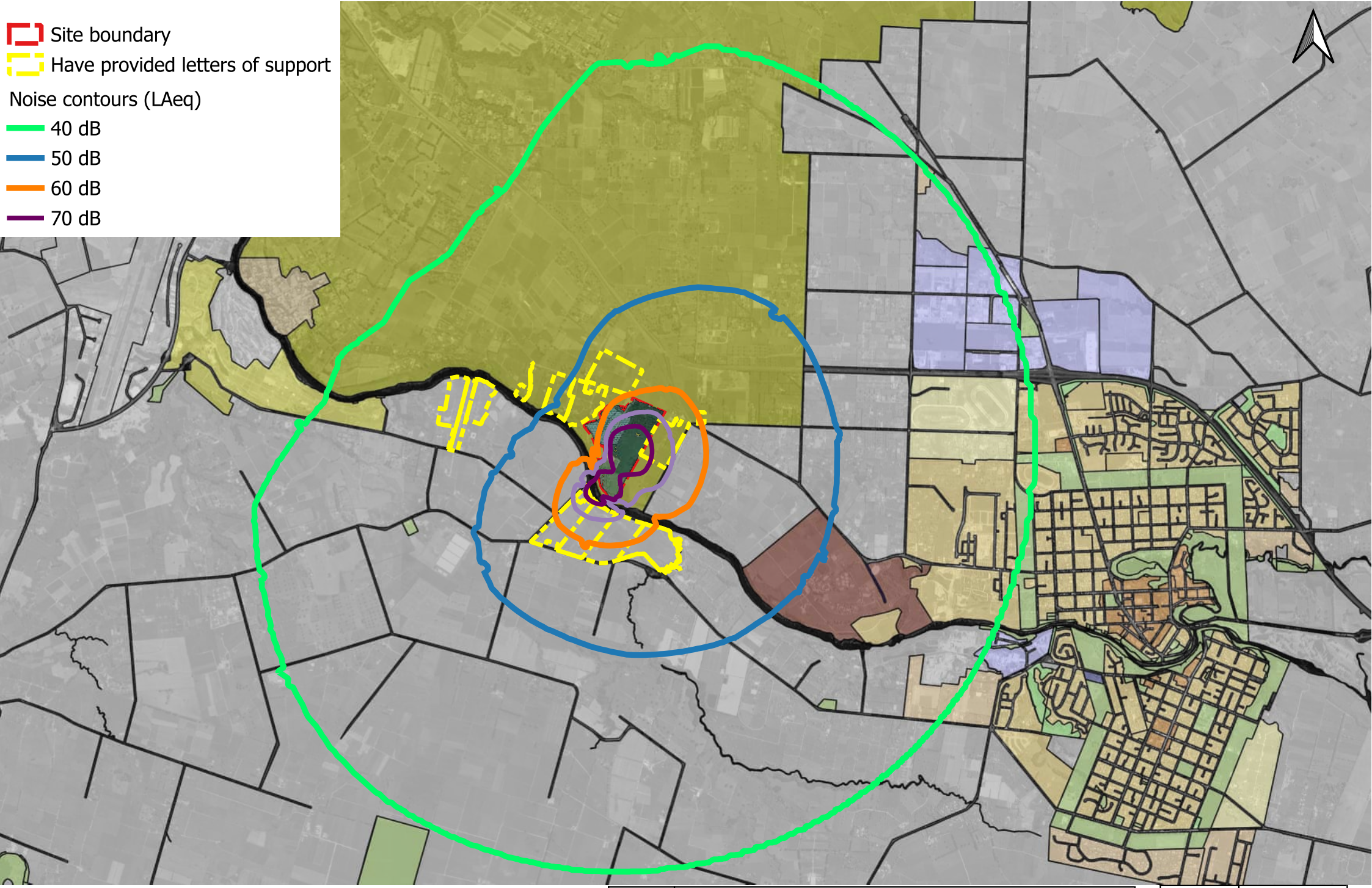


Styles Group
Acoustics & Vibration Consultants

0 1 2 km

Title	Predicted Noise Contours – Main Stage (Stage 2) only 29 and 30 December | 1:00–2:30 am
Project	Live Nation 2027/28

Date	06/11/26
Revision	V1
Author	M. Chambers



Styles Group
Acoustics & Vibration Consultants

Title	Predicted Noise Contours – Main Stage (Stage 2) and Stage 5 New Year's Eve | 1:00–3:30 am
Project	Live Nation 2027/28

Date	06/11/26
Revision	V1
Author	M. Chambers

Appendix C Predicted noise grids for bat weightings

Consulting Advice Note

Styles Group
Acoustics & Vibration Consultants

P. 09 308 9015
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Date	4 November 2026
From	Martyn Chambers
Project	Live Nation 2027
Re	**Bat Weighting Calculation Process**

Introduction

The pekapeka-tou-roa, (the New Zealand long-tailed bat (**Long-Tailed Bat**)) is an echo-locating bat. It echo-locates during flight to find prey and navigate. The echo-location frequency is very high, and above the hearing range of humans.

The most sensitive of humans can hear sounds in the range from approximately 20Hz to 20,000Hz (20kHz). Most humans hear sounds in the range from around 25Hz to 14-16kHz.

The Long-Tailed Bat echo locates at much higher frequencies between approximately 30kHz to 80kHz. Their hearing is very sensitive to sounds in this range.

This is illustrated approximately in Figure 1 below:

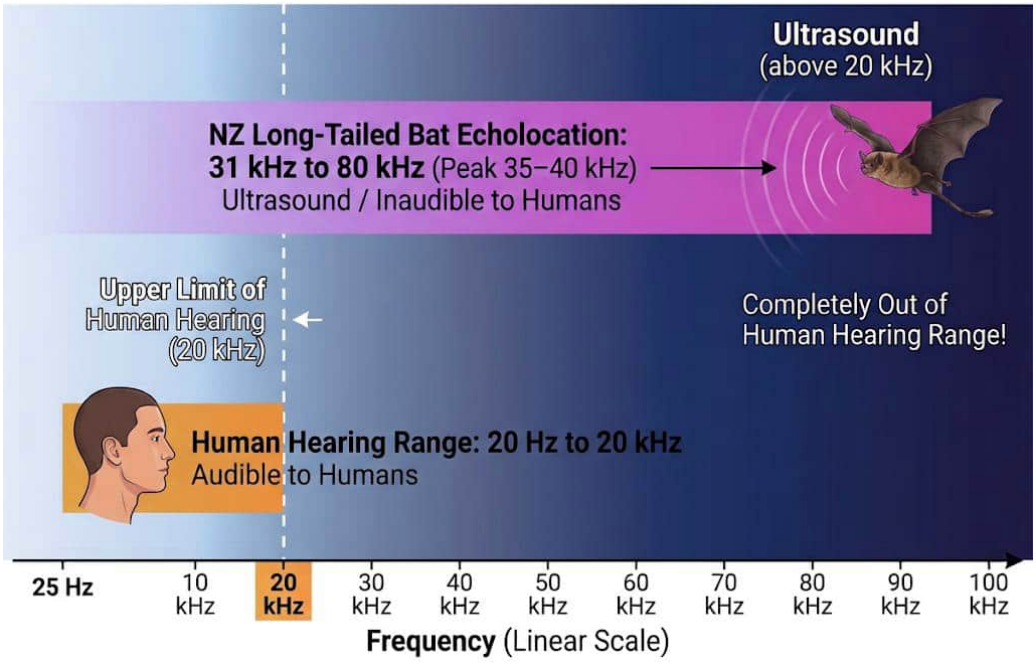


Figure 1 – Human hearing frequency range vs Long-Tailed Bat echo-location frequency range

However, the sensitivity of Long-Tailed Bats hearing at frequencies below their echo-location range is not known as there are no published audiograms available.

We have recommended that the frequency content of all amplified sound and voice is electronically controlled so that the systems do not produce any appreciable output above 16kHz. This will be achieved by:

1) Electronically controlling the signal to the amplifiers and loudspeakers to reduce any content above 16kHz; and

2) Relaying on the speaker design to ensure that there is essentially no content above 20kHz. This is an inherent feature of loudspeaker systems so they are not wasting energy producing sounds that humans cannot hear.

This means that the frequency range of the amplified sound will not overlap with the echo location frequency range of the Long-Tailed Bat and the separation between them will be as great as possible.

Weighting curve calculations

The echo-location frequency of the Long-Tailed Bat is well known, but the frequency range of their hearing is not. It is possible that the frequency range of their hearing may extend down to overlap with human hearing to some extent.

As set out above, published audiogram data for the Long-Tailed Bat was not available for this assessment. Following consultation with the Project Ecologist, published audiogram data for two other bat species were selected as suitable proxies: the Japanese house bat, *Pipistrellus abramus* (**House Bat**), from Boku et al. (2015)[1], and *Lasiurus borealis* (**Red Bat**), from Obrist and Wenstrup (1998)[2].

The House Bat weighting uses the mean audiogram in Figure 3(a) of Boku et al. (2015). The Red Bat weighting uses the average of the Day 2 mean curve in Figure 3A and the Average curve in Figure 3B of Obrist and Wenstrup (1998). Below 5 kHz, usable data were available for only the Red Bat.

Each weighting curve was set to 0 dB at the frequency of greatest hearing sensitivity. These frequencies were approximately 30 kHz for Red Bat and 42 kHz for House Bat. No weighting correction was therefore applied at these frequencies. Negative corrections were applied at other frequencies to reflect the reduction in hearing sensitivity relative to the most sensitive frequency.

The audiograms did not extend down to the 25 Hz required for the calculations. The correction at the lowest usable frequency, 4 kHz for House Bat and 2.5 kHz for Red Bat, was therefore held constant down to 25 Hz. This extrapolation assumes that hearing sensitivity remains constant below the available data. It provides a conservative estimate as the sensitivity is expected to decrease as the frequency lowers.

---

[1] Boku, S., Riquimaroux, H., Simmons, A. M., & Simmons, J. A. (2015). Auditory brainstem response of the Japanese house bat (*Pipistrellus abramus*). *The Journal of the Acoustical Society of America, 137*(3), 1063–1068. https://doi.org/10.1121/1.4908212

[2] Obrist, M. K., & Wenstrup, J. J. (1998). Hearing and hunting in red bats (*Lasiurus borealis*, Vespertilionidae): Audiogram and ear properties. *Journal of Experimental Biology, 201*(1), 143–154. https://doi.org/10.1242/jeb.201.1.143

As above, we have recommended that the PA system is controlled so that there is no appreciable content above 16 kHz. The assessment therefore covered one-third-octave bands from 25 Hz to 16 kHz. The weighting curves for the bats are shown in the figures below.

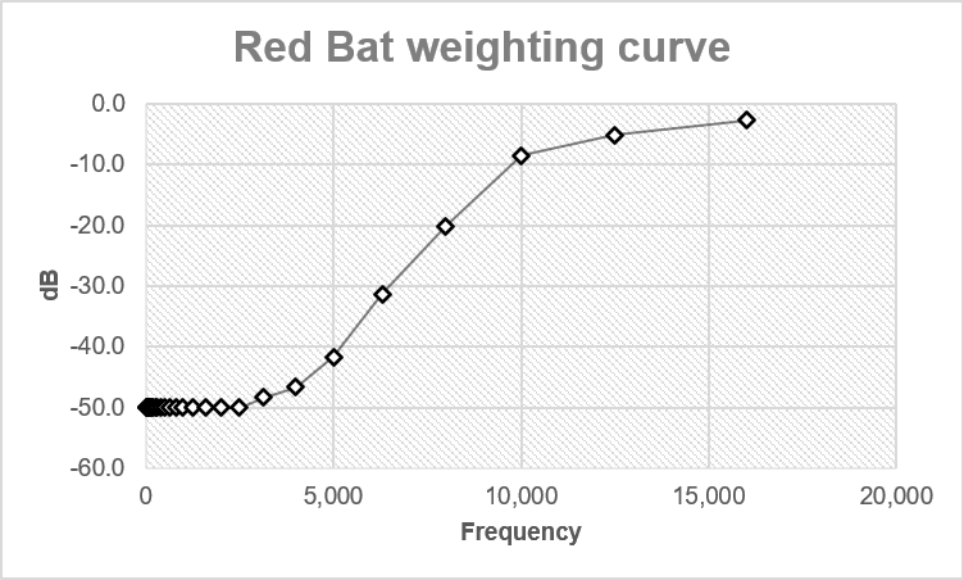


Figure 1 Red Bat weighting curve

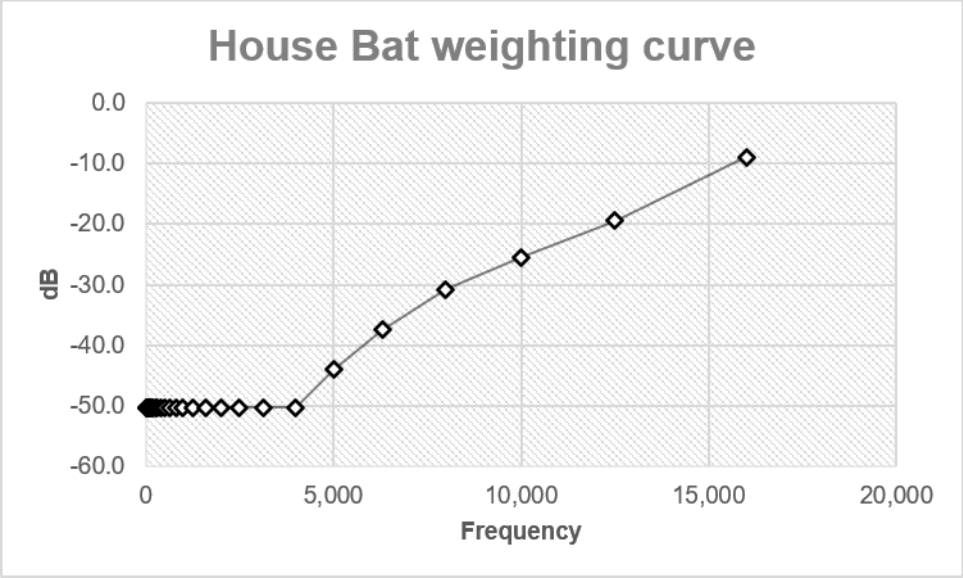


Figure 2 House Bat weighting curve

Noise modelling

A receiver grid was established at 8 m above ground over the wooded areas near the Site. We used DGMR iNoise software to predict unweighted one-third-octave sound pressure levels at each point. Modelled band results were available up to 10 kHz for this assessment. The predicted 10 kHz level was also assigned to the 12.5 kHz and 16 kHz bands. This approach does not take into account the additional atmospheric attenuation expected at these higher frequencies and is conservative in that respect.

The weighting corrections were applied to the frequency-band results at each receiver. The corrected bands were summed logarithmically to give a single level for each species, labelled **dB House Bat** and **dB Red Bat**. The receiver points were colour-coded in 5 dB bands to show how the weighted noise levels vary across the wooded areas.

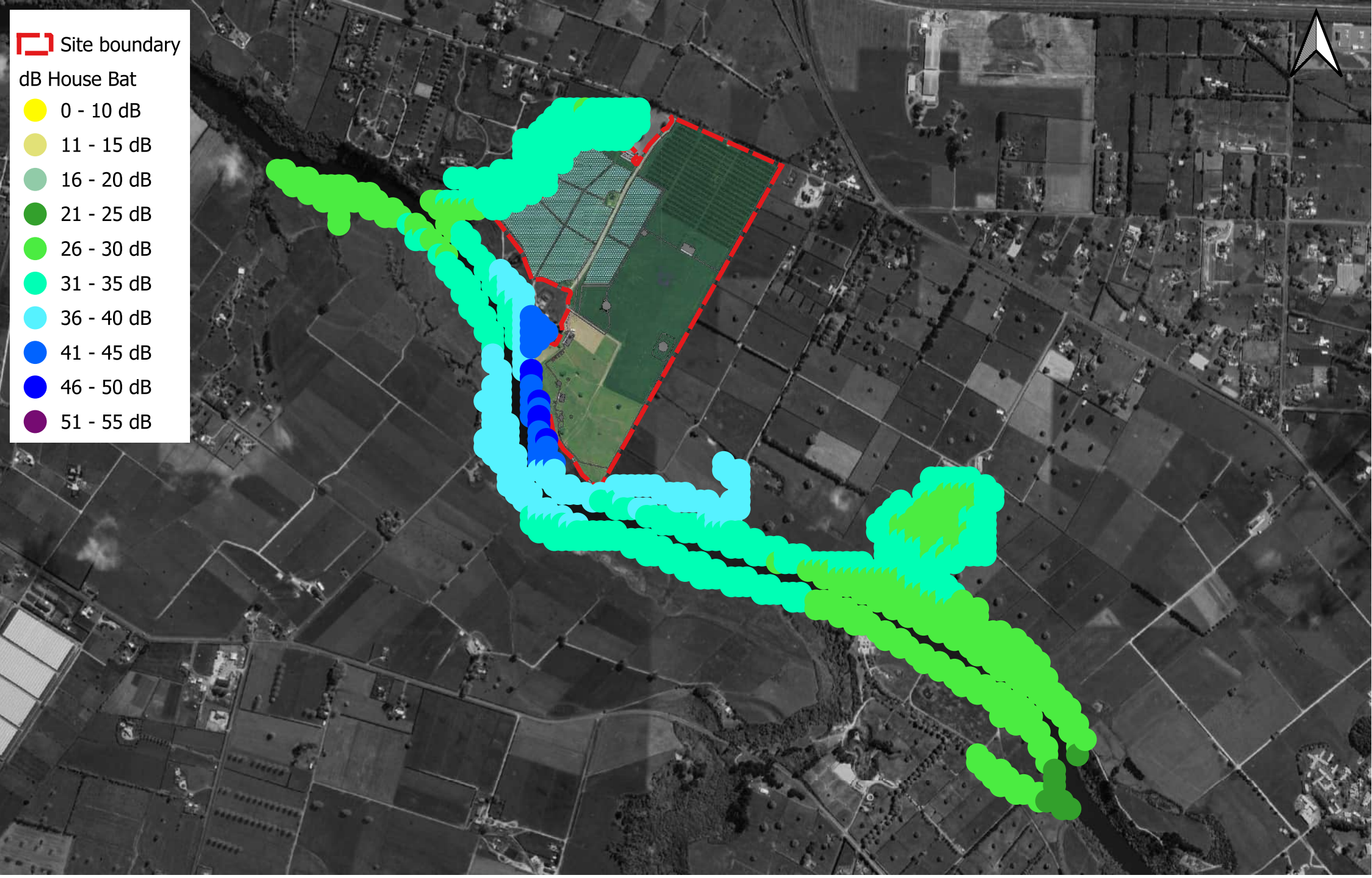
Results

The highest predicted noise levels in the wooded areas were 48 dB using the House Bat weighting and 52 dB using the Red Bat weighting. These are relative sensitivity-weighted results. The weightings do not, by themselves, establish an absolute audibility or disturbance threshold. Visualisations of the predicted noise grids for both bat weightings are provided in Appendix A.

Please contact me if you require any further information.

Yours sincerely,

Martyn Chambers
Senior Consultant

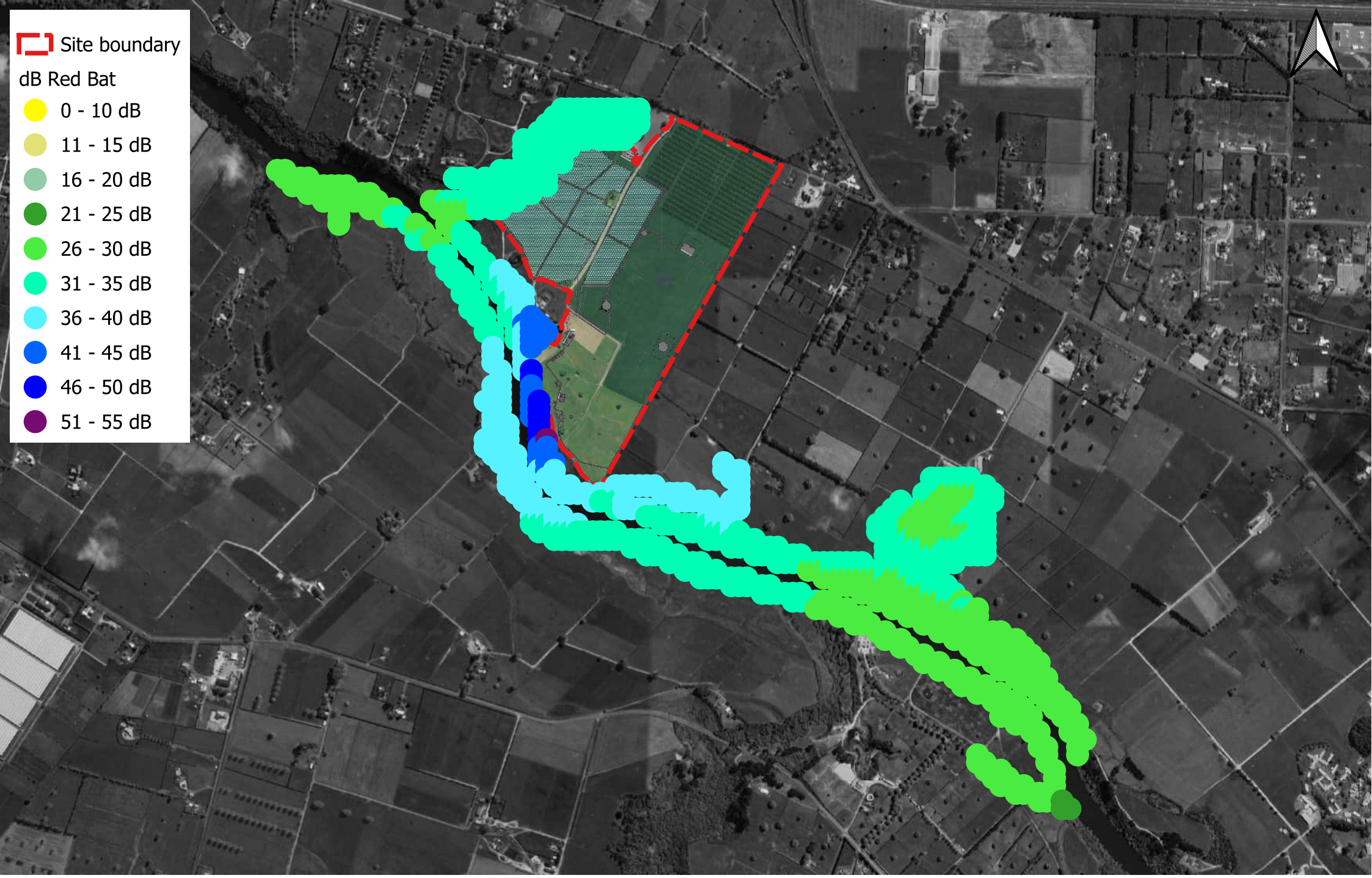


StylesGroup
Acoustics & Vibration Consultants

0 250 500 m

Title	dB House Bat Contour
Project	Live Nation Festival
Client	Live Nation

Date	30/10/26
Revision	V2
Author	M. Chambers



StylesGroup
Acoustics & Vibration Consultants

0 250 500 m

Title	dB Red Bat Contour
Project	Live Nation Festival
Client	Live Nation

Date	30/10/26
Revision	V2
Author	M. Chambers