

UNDER the Resource Management Act 1991 ("**RMA**")

AND

IN THE MATTER of a notice of requirement ("**NoR**") for a designation by KiwiRail Holdings Limited ("**KiwiRail**") for the Palmerston North Regional Freight Hub ("**Freight Hub**") under section 168 of the RMA

**STATEMENT OF EVIDENCE OF STEPHEN CHILES
ON BEHALF OF KIWIRAIL HOLDINGS LIMITED**

ACOUSTICS

1. SUMMARY

- 1.1 I am an acoustics specialist with specific experience in large infrastructure projects and have been engaged by KiwiRail to assist with the development of the Freight Hub. I was responsible for the Acoustics Assessment of operational and construction noise and vibration effects for the Freight Hub that was included with the Assessment of Environmental Effects ("**AEE**") as Technical Assessment Report D.
- 1.2 For each aspect of the acoustics assessment, I have established guideline criteria based on New Zealand Standards where available and otherwise with reference to international standards.
- 1.3 For the indicative site layout of the Freight Hub, I have considered likely noise and vibration emissions that may occur. For operational noise (on-site) I have used a computer model based on source data measured at other existing sites with similar activities to those proposed as part of the Freight Hub. For operational road-traffic noise, I have made a specific calculation for the new perimeter road, and for operational vibration and construction noise and vibration I have used indicative levels from previous projects.
- 1.4 I have examined the existing environment through observations and sound level measurements at representative locations around the Freight Hub.

- 1.5 I have compared predicted noise levels with guideline criteria and considered potential effects in the context of the existing environment. Without mitigation I have found that operational noise (on-site) could cause disturbance to residents over a wide area. I have found that residents may hear and feel operational noise (road-traffic), operational vibration and construction noise and vibration, but at levels within guideline criteria that should not cause undue disturbance.
- 1.6 I have identified controls that could be implemented to reduce emissions. For operational noise (on-site) I have found that a range of controls are required to mitigate adverse effects, including substantial noise barriers and treatment of some houses, in addition to future modelling and permanent monitoring. I have recommended that these matters be addressed through an Operational Noise and Vibration Management Plan as specified in the proposed conditions attached to Ms Bell's evidence as Appendix 1 ("**Proposed Conditions**"). For other aspects of the assessment, I have found that standard controls should be adequate to manage the potential effects. For construction noise and vibration these standard controls include use of a Construction Noise and Vibration Management Plan as specified in the Proposed Conditions.
- 1.7 I have recommended practical systems to implement all necessary noise and vibration controls as summarised above. With these controls, I consider the residual noise and vibration should be at reasonable levels and effects should be acceptable in this environment.
- 1.8 I have read the submissions relating to noise and vibration and have commented on matters raised by way of themes. I have read the technical evidence of Nigel Lloyd, who is the Section 42A noise report author. Mr Lloyd and I generally agree on fundamental matters of operational and construction noise and vibration criteria and the anticipated effects likely to arise from the Freight Hub. I have commented on areas where Mr Lloyd and I have differing opinions and on amendments to the designation conditions proposed by Mr Lloyd.

2. INTRODUCTION

- 2.1 My full name is Dr Stephen Gordon Chiles. I am an acoustics engineer self-employed by my company Chiles Limited. I hold the qualifications of Doctor of Philosophy in Acoustics from the University of Bath, and Bachelor of Engineering in Electroacoustics from the University of Salford. I am a Chartered Professional Engineer and a Fellow of the UK Institute of Acoustics.

Experience

- 2.2 I have been employed in acoustics (noise and vibration) since 1996. I have previously held positions as a research officer at the University of Bath, a principal environmental specialist for Waka Kotahi NZ Transport Agency ("**Waka Kotahi**"), and have worked as a consultant for the international firms Arup, WSP, and URS, and for the specialist firms Marshall Day Acoustics and Fleming & Barron.
- 2.3 I have undertaken acoustics assessments for and assisted with the designs for numerous infrastructure, industrial, commercial, recreational and residential developments, including major road projects and reconductoring of high voltage transmission lines. I was responsible for the acoustics assessment for Te Ahu a Turanga, Manawatū Tararua Highway and am currently involved in the Ōtaki to north of Levin project for Waka Kotahi.
- 2.4 I have extensive experience advising on and assessing noise and vibration effects from the railway network. I have frequently been engaged by KiwiRail over the last decade to advise on various noise and vibration issues associated with the railway network, including in relation to the Paekākāriki and Wairoa rail yards, the Temuka container transfer site, the monitoring and operation of the track and rolling stock, and controls for new sensitive land uses establishing near railways. I have also been involved in railway noise and vibration issues in association with other infrastructure projects that involved re-establishing or relocating railway lines, including the previously proposed Holcim Weston cement plant, and the Peka Peka to North Ōtaki and Baypark to Bayfair Link road projects.
- 2.5 I was an Independent Commissioner for plan changes for Queenstown and Wanaka Airports and a plan variation for Port Nelson, which addressed noise effects around large transportation infrastructure sites.
- 2.6 I am an independent professional advisor to Waka Kotahi for noise and vibration. I am frequently engaged to review or advise on matters relating to the development, operation and maintenance of the state highway network. I was the editor of guides on road-traffic noise assessment, noise barriers, road surface noise, building treatment, land-use planning for sensitive activities near highways, and construction and maintenance noise and vibration.
- 2.7 I am currently subcontracted by Southern Monitoring Services as the principal advisor for the Environmental Noise Analysis and Advice Service, advising the Ministry of Health and Public Health Services on environmental noise.

2.8 I am a convenor of the New Zealand reference group for 'ISO' acoustics standards, an observer of the 'IEC' committee for acoustics instrumentation standards and a member of joint Australian and New Zealand committees for acoustics standards. I was chair of the 2012 New Zealand acoustics standards review group, chair for the 2010 New Zealand wind farm noise standard revision and member for the 2008 New Zealand general environmental noise standards revision.

Involvement in the Freight Hub

2.9 I was engaged by KiwiRail in July 2019 to advise on and assess operational and construction noise and vibration associated with the Freight Hub. For this work I have:

- (a) undertaken acoustics evaluations for each stage of the multi criteria analysis ("**MCA**") used by KiwiRail to identify the preferred site for the Freight Hub (AEE Volume 2, Appendix F5);
- (b) advised KiwiRail in developing the indicative site layout for the Freight Hub;
- (c) attended community meetings at Bunnythorpe School, and online, in July and September 2020;
- (d) prepared the Acoustics Assessment that was included with the AEE for the Freight Hub (AEE Volume 3, Technical assessment report D);
- (e) provided input to KiwiRail's section 92 response dated 15 February 2021 (Attachment 7) ("**First Section 92 Response**"); and
- (f) provided input to KiwiRail's section 92 response dated 28 May 2021 regarding noise and vibration matters (Attachment 6) ("**Third Section 92 Response**").

2.10 I have been assisted in this work by Michael Smith of Altissimo Consulting. Mr Smith has reviewed my assessment, deputised for me during parts of the MCA process, and conducted the acoustics computer modelling and measurements.

Code of conduct

2.11 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence

is within my area of expertise, except where I state that I am relying on the evidence of another person.

3. SCOPE OF EVIDENCE

3.1 This statement of evidence will:

- (a) provide an overview of the methodology and key conclusions of the Acoustics Assessment;
- (b) respond to the submissions received that relate to noise and vibration matters; and
- (c) address relevant matters raised in the Council's Section 42A Report ("**Section 42A Report**").

4. METHODS OF ASSESSMENT

4.1 As set out above, my involvement with the Freight Hub has included input to the site selection and development of the indicative design, as well as assessment of the noise and vibration effects of the Freight Hub as it is now set out in the NoR. My work has been iterative in that I have been evaluating potential effects since being engaged at the start of the MCA process in mid-2019, and I have been working with the project team to adjust and develop the indicative design to reduce and mitigate those effects where practicable. This process has contributed to specific elements of the indicative design that are beneficial for noise and vibration as set out in Section 1 of the Acoustics Assessment (also in the response to request 30 of the First Section 92 Response). The Acoustics Assessment and my evidence consider the effects of the Freight Hub, including this configuration of key elements on the site in the indicative design.

4.2 My Acoustics Assessment addresses construction and operational noise and vibration effects associated with the Freight Hub. Criteria, potential effects and appropriate assessment methodologies vary for different aspects so I have separately considered:

- (a) operational noise (on-site);
- (b) operational noise (road-traffic);
- (c) operational vibration; and

(d) construction noise and vibration.

- 4.3 As set out in Section 1 of the Acoustics Assessment,¹ I have not considered noise and vibration from trains on the North Island Main Trunk ("NIMT") that operate in an existing designation authorising that activity, and I have not considered alteration of the national locomotive and wagon fleet to be a practicable option for noise mitigation for this specific site.

Operational noise (on-site)

- 4.4 In the Acoustics Assessment and my evidence, I use the term "on-site" to refer to activity within the Freight Hub, which excludes the new perimeter road and ancillary areas for stormwater retention, noise barriers and landscaping outside the Freight Hub. The Proposed Conditions will set noise criteria for on-site activity in place of underlying District Plan zone rules. While the zone rules can remain a relevant benchmark for establishing criteria, in this case the District Plan exempts most train activity from the noise limits.
- 4.5 There is no standardised method in New Zealand for assessing operational noise from an activity of this nature (being an intermodal freight and distribution hub). I have therefore considered noise effects with reference to a range of analogous standards,² and through broader consideration of changes in sound levels and potential sound characteristics. I have adopted progressive noise criteria, with three steps.³ The first step is to achieve Category A external daytime, evening and night-time noise limits at existing houses. If that is not practicable, the second step (Category B) is treatment of existing houses to be implemented by KiwiRail if required to maintain reasonable internal noise environments. The final step is Category C upper external noise limits not to be exceeded at existing houses. The relevant categories and criteria are set out below in Figure 1.

¹ Technical Report D, dated 23 October 2020, at page 7.

² Technical Report D, dated 23 October 2020, at page 17, Table 4: airports (NZS 6805), ports (NZS 6809).

³ Technical Report D, dated 23 October 2020, at page 18, Table 5.

Noise criteria		Comments
Category A	Day: <55 dB LAeq(1h) Evening: <50 dB LAeq(1h) Night: <45 dB LAeq(1h) Night: <75 dB LAfmax	Similar to existing noise allowed from the NEIZ. A change from existing Rural Zoned activity (R9.11.1), but noise would remain compatible with residential activity in both rural and residential zones.
Category B	Day: 55-65 dB LAeq(1h) Evening: 50-60 dB LAeq(1h) Night: 45-55 dB LAeq(1h) Night: 75-85 dB LAfmax	Houses may need to be acoustically treated and mechanically ventilated as necessary to meet a level of 35 dB LAeq(1h) in bedrooms and 40 dB LAeq(1h) in other habitable spaces.
Category C	Day: >65 dB LAeq(1h) Evening: >60 dB LAeq(1h) Night: >55 dB LAeq(1h) Night: >85 dB LAfmax	Freight Hub noise is likely to be incompatible with residential activity.

Figure 1: Operational Noise Criteria

4.6 Under my direction, my subconsultant Mr Smith has obtained indicative sound level data for the main Freight Hub activities on the selected site, primarily by taking measurements at other existing rail facilities, as set out in Section 5 of the Acoustics Assessment.⁴ The main Freight Hub activities measured were:

- (a) rail movements;
- (b) container and log handling;
- (c) refrigerated containers;
- (d) workshop activity;
- (e) truck movements; and
- (f) ventilation plant.

4.7 Mr Smith has then prepared a computer model of the Freight Hub and surrounding area to predict noise contours generated by indicative activity.⁵ This relates to a busy one-hour period of activity at the Freight Hub ("**Site**") and has been repeated with and without indicative noise barriers around the Site. Details of this modelling are set out in Section 5 of the Acoustics

⁴ Technical Report D, dated 23 October 2020, at pages 23 to 27.

⁵ Technical Report D, dated 23 October 2020, at page 28, Table 11. The sources considered were a number of locomotive and wagon movements, cut-offs and break squeals, top loaders, forklifts, reefers, road trucks, log loaders, various emissions from workshops, and ventilation fans.

Assessment.⁶ I have also considered maximum sound levels of short duration events based on the separation distance from activities.

- 4.8 In response to the Third Section 92 Request 11, I arranged for Mr Smith to conduct an additional sound level survey at the Rail yard at Tremaine Avenue ("**Existing Freight Yard**") to specifically capture the sound of coupling during shunting activities. A summary of these additional measurements is attached as **Appendix A**. The individual sound level maxima from coupling are essentially the same as levels previously assessed from other aspects of the Freight Hub and the results do not alter the indicative noise contours, or my assessment findings.
- 4.9 Using the predicted sound levels for operational (on-site) activity I have considered potential effects at houses in the area with reference to the Category A, B and C criteria I have discussed at paragraph 4.5 above, and the existing environment which I describe below.

Operational noise (road-traffic)

- 4.10 I have evaluated operational road-traffic noise from the new perimeter road with reference to criteria in the applicable New Zealand Standard (NZS 6806). The District Plan references NZS 6806 for road-traffic noise, and the new perimeter road falls within the scope of that standard. NZS 6806 sets absolute rather than relative noise criteria to protect people living near roads from sleep disturbance and to provide a reasonable level of residential amenity.⁷ I have predicted road-traffic noise at the nearest house to the new perimeter road using a Waka Kotahi online calculator and compared the level with the criteria in NZS 6806.
- 4.11 For roads in the wider area, I have examined future traffic forecasts with and without the Freight Hub to identify roads where the Freight Hub could cause a significant increase in general traffic or trucks in particular. In Section 5 of the Acoustics Assessment, I have identified three sections of road based on 2031 traffic forecasts.⁸ In the First Section 92 Response, I repeated this exercise using a traffic forecast for 2041 with the full development of the Freight Hub.⁹ For this 2041 scenario, I identified a fourth section of road (part of Railway Road) that may also have a significant increase in trucks as set out in the First

⁶ Technical Report D, dated 23 October 2020, at pages 23 to 29.

⁷ Technical Report D, dated 23 October 2020, at page 20, Table 6.

⁸ Technical Report D, dated 23 October 2020, at page 30, Table 13: 2031 forecast; parts of Stoney Creek Road, Roberts Line, and Kairanga Bunnythorpe Road.

⁹ First section 92 response, Attachment 9.

Section 92 Response. For each of the roads with significant increases in traffic due to the Freight Hub I have considered the resulting traffic volumes in terms of the nature and classifications of the specific roads.

Operational vibration

- 4.12 I have evaluated operational rail vibration with reference to an overseas criterion (Norwegian Standard NS 8176 Class C: 0.3 mm/s $v_{w,95}$) that is commonly used in New Zealand for both road-traffic and rail vibration, as set out in Section 4 of the Acoustics Assessment.¹⁰ I made a screening assessment to check whether any existing residential dwellings would be close enough to a new section of rail track in the Freight Hub to be at risk of exceeding this guideline criterion, based on indicative data from a previous project.

Construction noise and vibration

- 4.13 I have adopted criteria from the applicable New Zealand Standard (NZS 6803) to evaluate construction noise,¹¹ and criteria published by Waka Kotahi (based on international standards) for construction vibration.¹² For both construction noise and vibration, I identified locations where there is risk of exceeding criteria based on typical distances for similar types of activity on previous projects, as set out in Section 5 of the Acoustics Assessment.¹³ I then considered the practicality of management measures for construction activity in those specific locations.

5. EXISTING ENVIRONMENT

- 5.1 Details of my assessment of the existing environment are set out in Section 3 and Appendix A of the Acoustics Assessment. My focus is on the noise environment at existing dwellings around the Site. I have considered existing noise in the area based on measurements made over a week at four representative locations, coupled with short duration 'spot' measurements and observations at those four locations together with an additional three locations.

- 5.2 The survey locations along with an indication of District Plan zoning are shown on the following Figure 2, taken from the Acoustics Assessment.¹⁴ The

¹⁰ Technical Report D, dated 23 October 2020, at pages 20 to 21.

¹¹ Technical Report D, dated 23 October 2020, at page 21, Table 7.

¹² Technical Report D, dated 23 October 2020, at page 22, Table 8.

¹³ Technical Report D, dated 23 October 2020, at page 32, Figure 10, and First Section 92 Response, Attachment 7, Figures 12 to 17.

¹⁴ Technical Report D, dated 23 October 2020, at page 11, Figure 1.

measurements were made by Mr Smith, and I have also personally observed the area around the Site on several occasions, including inspection of the locations of nearby dwellings.

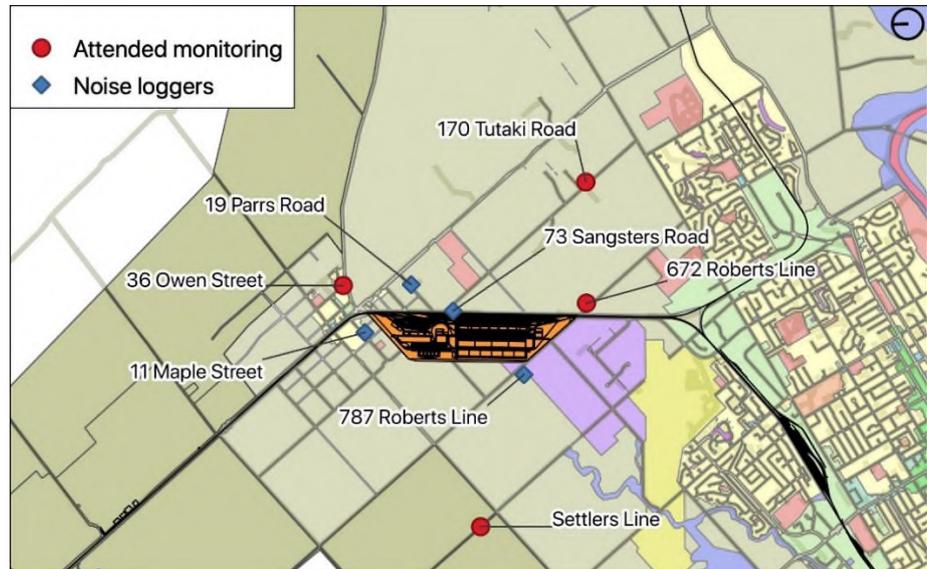


Figure 2: Survey Locations

5.3 I have found that the existing noise environment varies significantly around the Freight Hub Site and between different times of day. Parts of the area are in transition with the ongoing development of the North East Industrial Zone ("NEIZ"), whereby progressively more anthropogenic sounds are present. Many occupiers of dwellings in the area surrounding the Site are currently exposed to noise from road, rail, airport and industrial activity, as well as from general environmental sounds. At some locations individual trains, aircraft and trucks can cause relatively high sound levels as they pass.

5.4 However, at times and particularly in locations further from existing activity, there can be relatively quiet periods, although not akin to say a remote rural area. Detailed tables and graphs showing the measured sound levels are in the Acoustics Assessment.¹⁵

6. ASSESSMENT OF POTENTIAL ACOUSTIC EFFECTS

6.1 As summarised below, my assessment focuses on adverse noise and vibration effects from the operation and construction of the Freight Hub, which to some extent are inherent in large infrastructure of this nature.

¹⁵ Technical Report D, dated 23 October 2020, at pages 11 to 15, Tables 1/2, Figures 2 to 7, and Appendix A.

Positive effects

6.2 In Section 6 of the Acoustics Assessment, I outline a number of positive noise and vibration effects associated with the Freight Hub.¹⁶ In summary, these are:

- (a) removal of activity at the Existing Freight Yard is likely to result in reduced noise exposure of nearby houses, particularly to the north;
- (b) realignment of the NIMT between Roberts Line and Bunnythorpe which consequently enables construction of the east noise barrier will reduce noise and vibration at houses to the east. In particular:
 - (i) the NIMT will be further away from these houses;
 - (ii) the trains will be moving on a flattened section of the NIMT (this section of the NIMT currently undulates significantly but the Freight Hub will be a level site);
 - (iii) the new tracks on the NIMT on uniformly compacted ground will minimise discontinuities and structures likely to give rise to vibration; and
 - (iv) removal of all road crossings over the railway will reduce the need for any bells or use of train horns on that section of the NIMT;
- (c) removal of a section of Railway Road between Roberts Line and just before Maple Street will reduce road-traffic noise at houses to the east; and
- (d) closing Roberts Line at Railway Road will result in significantly less traffic to the south on Roberts Line and reduced road-traffic noise affecting nearby houses.

Adverse effects

Operational noise (on-site)

6.3 Without mitigation, as represented in Figure 3 below taken from the Acoustics Assessment,¹⁷ the computer modelling shows the operation of the Freight Hub

¹⁶ Technical Report D, dated 23 October 2020, at page 33.

¹⁷ Technical Report D, dated 23 October 2020, at page 29, Figure 9.

could result in noise above recommended Category A criteria¹⁸ over a wide area. In my experience, such noise exposure in this environment would be likely to result in disturbance to residential activities, with the extent being dependent on the specific relationship of each individual house to the Freight Hub and existing noise sources.

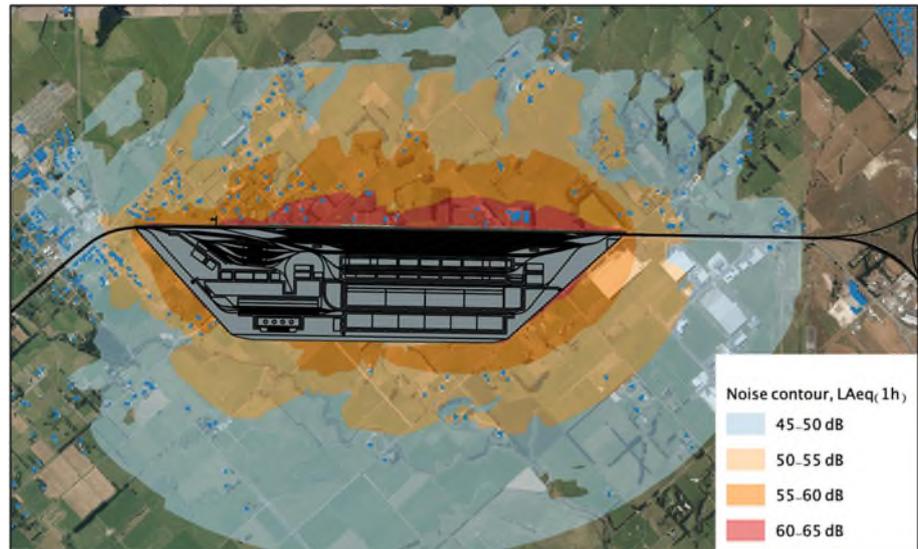


Figure 3: Noise modelling without mitigation

Operational noise (road-traffic)

- 6.4 The predicted noise level from road-traffic on the new perimeter road complies with the NZS 6806 Category A criterion. In my opinion, this indicates that while the noise from road-traffic will be clearly audible, it should be at a reasonable level compatible with residential activity.
- 6.5 As set out in Section 6 of the Acoustics Assessment,¹⁹ I have found that changes in traffic volumes on other roads in the wider area that can be attributed to the operation of the Freight Hub, and the associated noise, are within reasonable expectations for the types of road. These roads being classified as arterials or primary collectors (One Network Road Classification), or as a strategic freight route in the District Plan.

Operational vibration

- 6.6 Due to the separation of the new rail tracks from houses, there should be compliance with the guideline criterion (NS 8176 Class C) based on indicative levels. In my opinion, operational activity should therefore have only minor

¹⁸ Technical Report D, dated 23 October 2020, at page 18, Table 5.

¹⁹ Technical Report D, dated 23 October 2020, at page 36.

vibration effects. Vibration may be felt in some locations, but the majority of people should not be unduly disturbed.

Construction noise and vibration

- 6.7 With normal good practice management, construction noise and vibration effects should be minor due to the separation of works from most existing houses, the scope to avoid night works in most locations, and the ability to provide mitigation such as permanent or temporary screening, if required.

Conclusion on effects without mitigation

- 6.8 For operational noise (road-traffic), operational vibration, and construction noise and vibration, there should be compliance with criteria with standard controls applied, such as asphaltic road surface/noise barriers, uniform ground and track formation, and a Construction Noise and Vibration Management Plan. For these aspects the activity may be heard and felt, but at reasonable levels that should not cause undue disturbance to most people.
- 6.9 Based on the predictions without mitigation for operational noise from the Freight Hub (on-site), I consider that substantial controls are required to manage noise effects. These controls are discussed in the next section of my evidence.

7. MEASURES TO ADDRESS EFFECTS

Operational noise (on-site)

- 7.1 A critical outcome of my input to the Freight Hub development has been the inclusion / creation of sufficient space for substantial noise barriers on the east and north boundaries of the Freight Hub, in addition to a more typical 3 metre high noise barrier on the west boundary.
- 7.2 The east boundary of the Site is critical as it adjoins the large open marshalling area, so the indicative design has a 3 kilometre long, 5 metre high noise barrier on this boundary. I anticipate during detailed design that the central part of this noise barrier may be slightly increased in height (to say 7 or 8 metres high) to account for the elevated position of some houses.
- 7.3 The north boundary of the Site is complex as the ground level of the houses on Maple Street are generally higher than the Site. To be effective the noise barrier needs to be located on the higher ground nearer the houses making it 8 metres above the Site (3 metres above the local ground level). For the most affected houses the barriers provide in the order of 5 dB reduction. With

appropriate landscaping they should also assist in reducing the perception of noise through visual screening.

- 7.4 With the above indicative noise barriers, the modelling set out in Section 7 of the Acoustics Assessment shows that predicted noise contours reduce, although guideline criteria would still be exceeded for unconstrained operation with no limit on the type of equipment or timing of activities. These noise contours are shown in Figure 4 below reproduced from the Acoustics Assessment.²⁰

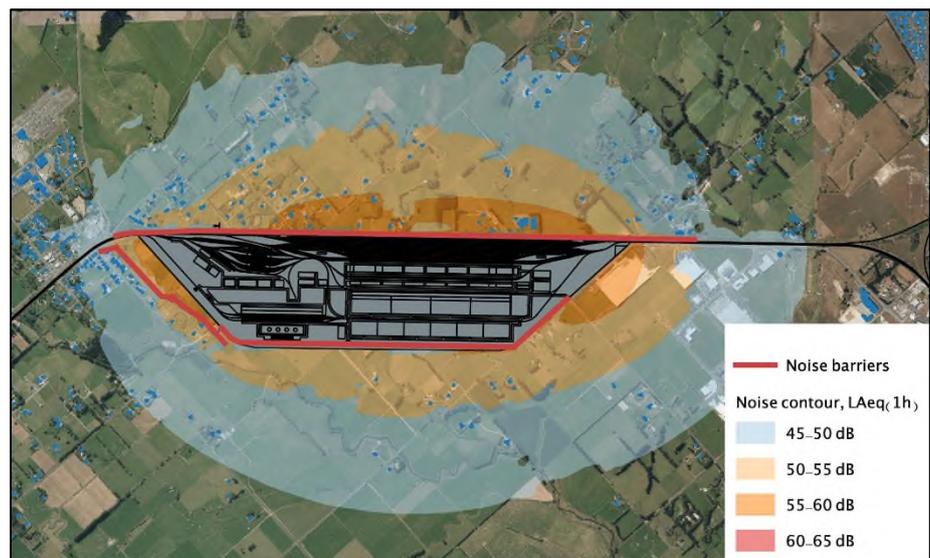


Figure 4: Noise modelling with mitigation

- 7.5 I have recommended extensive controls to address noise effects through an Operational Noise and Vibration Management Plan, as required by Proposed Conditions. These controls include:
- (a) operation in accordance with noise criteria as set out in the Acoustics Assessment;
 - (b) implementation of substantial noise barriers;
 - (c) determination of where Category A noise criteria may be exceeded (at the time of detailed design) and treatment of affected existing houses where required to achieve internal noise criteria;
 - (d) modelling and monitoring of noise and vibration, including permanent noise monitors; and

²⁰

Technical Report D, dated 23 October 2020, at page 38, Figure 12.

- (e) good practice site management to avoid unreasonable noise.²¹

Operational noise (road-traffic)

- 7.6 As discussed above, I consider that no specific controls should be required for operational road-traffic noise.

Operational vibration

- 7.7 As discussed above, I consider that operational vibration should not need further control, but I recommend this should be verified under the Operational Noise and Vibration Management Plan during detailed design and commissioning.

Construction noise and vibration

- 7.8 I have recommended that construction noise and vibration effects should be managed in accordance with standard practice, including implementation of a Construction Noise and Vibration Management Plan, as required by the Proposed Conditions. The Construction Noise and Vibration Management Plan will include:

- (a) details of the works including times/days, equipment including any noise / vibration controls, and projected noise and vibration levels;
- (b) identification of affected dwellings;
- (c) procedures for monitoring and reporting of construction noise and vibration; and
- (d) good practice site management.

Conclusion on effects with mitigation

- 7.9 KiwiRail has accepted all of my recommendations for noise and vibration controls, and these are included in the Proposed Conditions.
- 7.10 The Freight Hub will alter the existing noise environment in some areas, and construction and operational activity will be audible over a wide area. However, with the mitigation and controls I have recommended, the residual noise and vibration should be at reasonable levels and effects should be acceptable in this environment.

²¹ Technical Report D, dated 23 October 2020, at pages 38 and 39.

8. RESPONSE TO SUBMISSIONS

8.1 I have read all submissions relating to the acoustics effects of the Freight Hub. I met a significant proportion of the submitters at two community meetings at Bunnythorpe School in 2020 (some people on both occasions), and from those conversations I was aware of many concerns now raised in the written submissions and had considered them when preparing the Acoustics Assessment. However, there are a number of additional matters that have been raised in written submissions, which I respond to generally by way of themes rather than individual submissions.

8.2 In terms of general matters, several submitters raise concerns around construction noise and vibration. In my opinion, the Proposed Conditions²² are appropriate to manage the effects of construction noise and vibration as discussed in submissions. Various submitters also raise concerns about off-site road-traffic noise associated with changes to the network and traffic generated by the Freight Hub. I have set out above why I consider the Freight Hub will result in reasonable levels of off-site road-traffic noise with no specific controls required.

Site selection

8.3 Many submissions raise general concerns about adverse noise effects, particularly operational noise (on-site). This Site is relatively near to numerous existing residential properties and the operation of the Freight Hub will unavoidably change the existing noise environment. In the Acoustics Assessment and my evidence above, I have set out measures I have recommended to mitigate operational noise (on-site) and my finding that the resulting noise should be at reasonable levels.²³ However, there will still be a change to the noise environment currently experienced by many residents as a consequence of developing the Site.

8.4 Some submitters raise concerns that this location for the Freight Hub was not the best option in terms of operational noise effects. I provided information on noise effects to inform the site options assessment, with noise and vibration one of many considerations in choosing the preferred site. While other sites may have affected fewer people and had lesser noise effects, this consideration was balanced against other factors such as ecological effects, the proximity to industrial areas, and ability to efficiently integrate with the wider

²² Evidence of Karen Bell, dated 9 July 2021, at Appendix 1.

²³ Technical Report D, dated 23 October 2020, at page 41.

transport network. Further detail on the site selection process is set out in the evidence of Ms Poulsen and Ms Bell.

Curfew

- 8.5 There are numerous submissions that seek to limit hours of operation of the Freight Hub by introducing a curfew with no activity at night. The evidence of Mr Moyle explains why it is essential to KiwiRail for the Freight Hub to be able to operate at all times.²⁴
- 8.6 In terms of noise, some Freight Hub operations can be conducted in compliance with the Category A night-time noise criteria, set to avoid sleep disturbance. Such Freight Hub operations may include indoor activity, activity further from houses and lower noise generating vehicles and equipment. I do not consider there to be a valid reason to prevent such activity on the basis of noise effects.
- 8.7 For other activity that does not comply with the external Category A noise limits, the proposed operational noise (on-site) Category B criteria, would require houses to be treated to avoid sleep disturbance inside bedrooms. This process would occur through the Operational Noise and Vibration Management Plan as required by the Proposed Conditions. Again, if the noise effect is managed in this way, I consider it appropriate to allow this activity at night.

Detailed information

- 8.8 Many submitters have raised concerns around the level of details in the Acoustics Assessment (including in relation to night operations). In my opinion, the level of detail that submitters appear to be seeking should be provided at a later stage with Outline Plans, as the Freight Hub design is developed. I consider the level of detail in the Acoustics Assessment at this time to be sufficient to assess the envelope of noise effects, to establish the controls required as designation conditions and to have confidence there is sufficient space for practicable noise mitigation. I have been involved in notices of requirement for several state highway designations, without developed designs.²⁵ In my experience, it is normal in these cases for there to be only indicative designs rather than detailed designs at the time of the NoR.

²⁴ Evidence of Todd Moyle, dated 9 July 2021, at Section 7.

²⁵ Warkworth to Wellsford, Woodend Bypass, Hamilton Southern Links.

Personal health conditions

- 8.9 Several submissions refer to personal health conditions that may cause or contribute to increased noise sensitivity of some residents. I do not have specific expertise in personal health. As is normal for environmental noise assessments, my evidence is based on criteria for community response to noise. I understand from an RMA perspective that the approach is to treat noise sensitivity based on normal responses.

Noise barriers

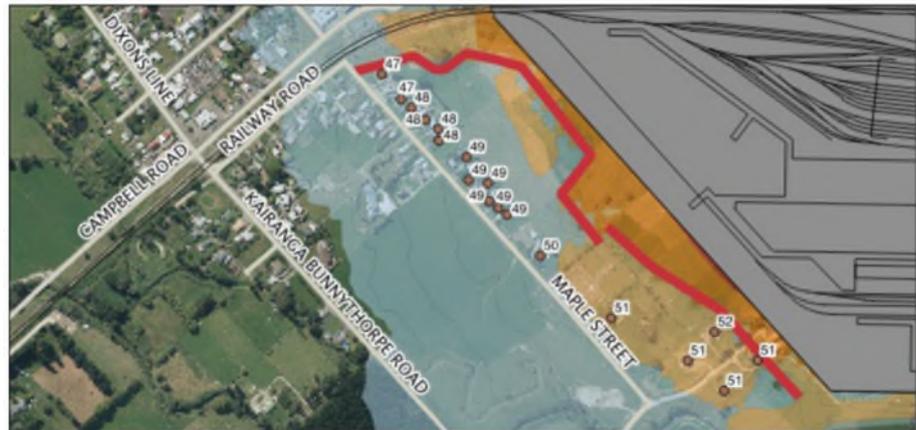
- 8.10 Various submitters seek for the indicative noise barriers to be established early in the construction process, although Glen and Karen Woodfield (Submitter 6) seek the opposite. In my opinion, noise barriers would provide a noise benefit if constructed early, as they would reduce construction noise and NIMT noise. However, the east noise barrier cannot be built until Railway Road is closed and the NIMT is moved, which, as set out in Mr Skelton's evidence, in turn need stormwater ponds, various earthworks and the new perimeter road to be completed.²⁶ I recommend that noise barriers be constructed as early as possible in the construction programme, but anticipate there will be practical constraints dictating the earliest timing for at least some parts of the barriers.
- 8.11 The earliest practicable timing for the construction of each noise barrier should be set out in the Operational Noise and Vibration Management Plan once the detailed design has been undertaken. I expect the north barrier by Maple Street will be constructed at an early stage before most other works, but the east and west barriers would be at a later stage. After construction for stormwater, earthworks, perimeter road, and NIMT, the east and west barriers should be constructed before further works on the Site. Any temporary localised barriers required to reduce construction noise would be identified in the Construction Noise and Vibration Management Plan.
- 8.12 Glen and Karen Woodfield seek that the indicative north noise barrier be realigned to the south away from the boundary with Maple Street houses. The north noise barrier location is constrained by the topography and to be effective it needs to be near the property boundary at both the east and west ends of Maple Street properties. However, towards the east there is scope for some refinement of the alignment. I have shown in Figure 5 below noise contours from the current noise model above an alternative illustrative barrier alignment. The practicality of this alternative alignment would need to be confirmed through detailed design and it needs to be adjusted to allow for the perimeter

²⁶ Evidence of Mike Skelton, dated 9 July 2021, at Section 7.

road. However, this indicates that there should be scope to refine the location of the bund away from some houses during detailed design.



Noise wall near residential boundary



Noise wall near site boundary

Figure 5: Alternative positioning of the north noise barrier

8.13 Helen and Pita Kinaston (Submitter 27) seek that the indicative west noise barrier to be realigned to the west of the new perimeter road, rather than along the boundary of the Freight Hub east of the new perimeter road. In this location the new perimeter road is in the order of 2 metres lower than the Freight Hub, primarily due to the existing height of Roberts Line at its proposed intersection with the new perimeter road. Therefore, a 3 metre high noise barrier to the west of the new perimeter road would only extend approximately 1 metre above the ground level of the Freight Hub and would not provide effective acoustics screening for vehicles and equipment operating along the west of the warehouse buildings. I therefore recommend the west noise barrier should remain at the Freight Hub boundary.

North Island Main Trunk

8.14 Several submissions raise concerns about noise and vibration from trains on the NIMT in the general area, including effects of longer trains and more

frequent trains. Letitia Stick (Submitter 39) questions why noise barriers do not extend from Palmerston North to Fielding. I have not considered these matters in my assessment as trains on the NIMT are operating in an existing designation authorising that activity.

- 8.15 Some submissions raise concerns with vibration from the portion of the NIMT through the Site. As set out in the Acoustics Assessment, vibration at the nearest houses to the east should significantly reduce due to the improved standard of the new NIMT alignment further from houses.²⁷

MidCentral District Health Board ("MDHB")

- 8.16 Vern Goodwin advised MDHB (Submitter 94) on environmental noise. I met Mr Goodwin to discuss issues he had identified, prior to the MDHB submission being lodged. I agree with Mr Goodwin (MDHB submission point 6) that KiwiRail should offer to meet the costs of treating houses if necessary to comply with the proposed criteria. This is required under the Operational Noise and Vibration Management Plan in the Proposed Conditions. I also agree with Mr Goodwin (MDHB submission point 7) that KiwiRail should adopt the Best Practicable Option to avoid unreasonable noise. This should be implemented under the Operational Noise and Vibration Management Plan and the Construction Noise and Vibration Management Plan as required by Proposed Conditions.
- 8.17 There is one technical matter where Mr Goodwin and I appear to disagree to some extent. This relates to the application of a penalty for special audible characteristics ("**SACs**") as raised in MDHB submission point 4. I also discussed essentially the same issue in the response to the First Section 92 Request for requests 18 and 19.
- 8.18 I agree with Mr Goodwin that sounds with SACs can cause more annoyance and these are normally (but not always) subject to a penalty to account for this effect. Typically, the penalty can be the addition of 5 dB to a noise level before determining compliance with a noise limit. The application of a penalty can be triggered by either subjective or objective evaluations.
- 8.19 A key reason I have recommended that the Freight Hub should not be subject to penalties for SACs is that normal railway noise has audible characteristics, and in my experience there are frequently conflicting subjective evaluations of whether particular characteristics constitute SACs. In some cases, such as for tonality, an objective evaluation can be used to resolve conflicting subjective

²⁷ Technical Report D, dated 23 October 2020, at page 33.

evaluations, but in other cases there is no objective method. The operational noise criteria I have proposed are designed for railway noise including normal railway noise characteristics.

- 8.20 As a means to at least partially address the concern raised by Mr Goodwin through the MDHB submission, I propose to modify the operational noise criteria so that a penalty for SACs is applied if shown to be applicable by an objective test in accordance with NZS 6802:2008. This would allow for SAC penalties to be applied for any tonal noise, but would avoid dispute over subjective evaluations of other audible characteristics of normal railway noise. To give effect to my recommendation the Proposed Conditions attached to Ms Bell's evidence as Appendix 1 have been updated and I agree with these changes.

Ministry of Education

- 8.21 The Ministry of Education (Submitter 92) raises questions around potential noise effects at Bunnythorpe School. I have addressed this matter in the Third Section 92 Response. In summary, due to the separation of the school from the Site, there should not be disturbance from construction or operational noise. In my opinion, no specific additional controls are required in relation to the school as the Construction Noise and Vibration Management Plan and the Operational Noise and Vibration Management Plan required by Proposed Conditions address potential effects at all locations.

Assessment methodology

- 8.22 Various submitters raise concerns with aspects of my assessment methodology. I have reviewed all of these matters and confirm that in my opinion I have applied an appropriate methodology. I will comment on some specific matters raised.
- 8.23 Rochelle & Rex McGill (Submitter 7) question monitoring being during a period partially affected by COVID travel restrictions. I do not consider this to be material, but any influence would be likely to result in lower measured levels and hence if anything overstating adverse noise effects of the Freight Hub.
- 8.24 Martin Jones (Submitter 16) questions standards applied, although appears to conflate a Norwegian Standard applied for rail vibration with a New Zealand Standard referenced with respect to aircraft noise. I confirm that I consider appropriate standards to have been applied. I note that the Norwegian Standard for rail vibration has been used as it has recommended criteria based

on surveyed response curves, rather than other standards Mr Jones quotes which are related but do not provide such criteria.

- 8.25 Danelle O'Keeffe and Duane Butts (Submitter 72) assert that significant baseline noise monitoring is required at various distances and directions from the Site. In my opinion, the monitoring that has been conducted is appropriate to provide an understanding of the existing environment. In terms of future compliance monitoring, this would be based on absolute levels so does not require a baseline in the same manner as say wind farms (under NZS 6808).

9. RESPONSE TO SECTION 42A REPORT

- 9.1 I have reviewed the sections of the Section 42A Report relevant to my evidence, particularly the report / evidence of Nigel Lloyd dated 18 June 2021.

- 9.2 Mr Lloyd has made an extensive commentary on my Acoustics Assessment. While Mr Lloyd and I have set some matters out in different ways or reached a conclusion for different reasons, my reading of his evidence is that, subject to comments below, we are generally in agreement on fundamental matters of the nature and extent of noise and vibration effects from the Freight Hub, and the appropriate operational and construction noise and vibration criteria. Some of the areas where Mr Lloyd and I diverge appear to relate primarily to legal or planning questions rather than technical acoustics matters. I will discuss these below.

- 9.3 I will focus my comments on key areas of difference between my Acoustics Assessment and Mr Lloyd's evidence. I will address changes to the proposed conditions recommended by Mr Lloyd in the appendix to his report. Where Mr Lloyd has raised issues with the wording of my assessment or minor details, while I do not necessarily agree with him, I do not comment on these unless they are material to outcomes.

North Island Main Trunk Line

- 9.4 Mr Lloyd has disagreed with my approach to the existing NIMT, by omitting it from the assessment of noise and vibration effects. The status of the existing operational NIMT and existing designation (which is not being altered by this NoR) a legal point rather than a technical acoustics matter and I therefore do not address this further in my evidence.

Detailed design

- 9.5 In numerous places in his evidence Mr Lloyd has expressed concern at the lack of detailed design, and lack of detailed acoustics calculations arising from that design. I understand the extent to which the designation process in the RMA allows for major infrastructure to be developed in a two-stage process with details (including detailed noise and vibration assessment and mitigation) following in an Outline Plan is a legal point rather than a technical acoustics matter. In my experience of large infrastructure projects like this, this is a common or well understood approach.

Special Audible Characteristics (SACs)

- 9.6 In paragraphs 70 and 110 of his evidence, Mr Lloyd considers that penalties for SACs should apply to operational noise. I have set out above (in relation to Mr Goodwin's comments) how I have modified my position on this point in response to the submission by MDHB. I agree that penalties should be applied if SACs are shown to exist by objective evaluation. This is addressed in the Proposed Conditions.
- 9.7 I note that Mr Lloyd makes reference to rules in the District Plan relating to new houses (and other noise sensitive activities) being constructed by existing railway designations. Those rules do not require the house designs to take account of any railway noise SACs, and my approach to the Freight Hub is consistent with those district plan rules.

Extended designation

- 9.8 Mr Lloyd considers that extending the designation should have been considered to allow for the purchase of houses to the east of the Site. During the MCA process I identified a particular issue with the Site as being the potential noise exposure of houses to the east. Consequently, as other factors indicated this was the emerging preferred site option, KiwiRail engaged me to undertake significant analysis into this issue.
- 9.9 I agree with Mr Lloyd that one potential option would be to purchase houses and from an acoustics perspective that would avoid any noise and vibration effects on those people. However, such an approach may be undesirable from other perspectives, such as poor sustainability in decommissioning / demolishing functional houses and impacts on an existing community in removing people and 'sterilising' land.
- 9.10 To assess alternative options, I worked with Mr Skelton, Ms Rimmer and others, to explore options for integrated treatment of the east boundary.

Together we concluded that the NIMT had to be moved to provide sufficient space for a substantial noise barrier and landscape treatment. Indicatively this noise barrier is a combined bund and wall extending 5 metres above the Freight Hub, but as set out above, I anticipate the central section may need to increase slightly during detailed design due to the elevation of some houses.

- 9.11 With the substantial eastern noise barrier, I consider there is scope to manage operational noise to comply with the criteria, without the need to extend the designation to purchase houses. This barrier was introduced after the MCA, so comments made at the MCA did not account for the potential benefit of the barrier.

House treatment

- 9.12 Mr Lloyd and I appear to be in agreement that KiwiRail should offer to fund building upgrades to any houses exposed to on-site operational noise over 45 dB $L_{Aeq(1h)}$ at night or 55 dB $L_{Aeq(1h)}$ during the day as required to meet internal noise criteria, with ventilation systems if windows need to be closed. We agree this should also apply if exposures are exceeded at upper floors of houses overlooking noise barriers. We agree this should happen before the noise exposure occurs.
- 9.13 Mr Lloyd proposes a system for implementing building upgrades based on assumptions that noise exposure will extend to the proposed control boundary and that night-time exposure will be the same as daytime exposure. In my opinion, both assumptions are incorrect.
- 9.14 The daytime and night-time noise exposure will not be known until the detailed design for each stage of the Freight Hub occurs. The noise control boundary and indicative contours provide an envelope of potential effects, but all efforts should be made to operate the Site with a smaller noise footprint if practicable. The need to investigate houses for building treatment within the actual noise contours should in itself provide a significant incentive to constrain the noise footprint.
- 9.15 Mr Lloyd references port and airport noise controls. However, a critical difference is that most port and airport building treatment I have been involved with includes existing noise exposure and therefore the controls are often structured accordingly. The difference here is that the noise exposure does not yet exist. While I agree houses should be treated before the exposure occurs, I do not consider it warranted for treatment to be speculative over a wide area in advance of the detailed design.

West barrier

- 9.16 Mr Lloyd recommends that the west noise barrier be moved to the west of the new perimeter road. I have discussed above how due to the topography a barrier to the west of the new perimeter road would be too low to effectively screen noise sources on the Site to the west of the warehouse buildings. Mr Lloyd does not set out any objective basis for a noise barrier being required on the west of the new perimeter road. My analysis of road-traffic noise is that a reasonable level of noise, consistent with NZS 6806, will be achieved without a barrier. In my opinion this indicative noise barrier should remain on the Site boundary to the east of the new perimeter road.

Designation conditions

- 9.17 As I have discussed above, Mr Lloyd and I appear to be in agreement on fundamental matters of appropriate noise and vibration criteria. Differences in the way these criteria could be applied through designation conditions is primarily a planning or legal matter rather than a technical acoustics matter. My comments below relate to the technical acoustics aspects of the amendments to designation conditions Mr Lloyd has proposed. These comments are with reference to the amended conditions as set out in Appendix A attached to Mr Lloyd's evidence. The conditions proposed by Mr Lloyd have been considered in more detail by Ms Bell and where appropriate, included in the Proposed Conditions at Appendix 1 to Ms Bell's evidence.²⁸
- 9.18 For construction noise and vibration, Mr Lloyd's proposed conditions WW and XX specify criteria consistent with my Acoustics Assessment. Ms Bell has considered the appropriateness of these conditions in her evidence.²⁹
- 9.19 Mr Lloyd proposes an addition to the Proposed Conditions requiring any night works to be assessed to show they will comply with noise and vibration limits. While I agree with the intent of this addition, in practice works such as road tie-ins, can only be conducted at night and cannot always comply with the noise limits. In such cases alternative measures should be taken to manage noise effects. In my opinion, such works are best addressed through the Construction Noise and Vibration Management Plan as required by the Proposed Conditions.
- 9.20 The general intent of Mr Lloyd's proposed additions relating to the Construction Noise and Vibration Management Plan are in accordance with how I consider

²⁸ Evidence of Karen Bell, dated 9 July 2021.

²⁹ Evidence of Karen Bell, dated 9 July 2021.

a Construction Noise and Vibration Management Plan should operate, but there are minor drafting issues to resolve. The updated Construction Noise and Vibration Management Plan condition is included at Appendix 1 to Ms Bell's evidence.³⁰

- 9.21 I disagree with Mr Lloyd's proposed condition YY1 as the criteria should apply at notional boundaries and not site boundaries, and there should be scope for consideration of specific houses. For example, if the exposed land is a utility space such as a driveway, rather than an outdoor living space, then noise effects may be acceptable.
- 9.22 Mr Lloyd's proposed condition YY2 (first instance of that number) sets a noise limit consistent with my Acoustics Assessment, subject to clarification that it applies to on-site activity and excludes the NIMT and new perimeter road. Mr Lloyd includes a note that an additional 45 dB contour is required. I disagree. Compliance assessment of 45 dB is generally impracticable and unnecessary. For ports and airports, while there are often multiple control boundaries for graduated actions relating to new sensitive land uses establishing around the infrastructure, the limit on the infrastructure noise emissions is only at one of those boundaries. For airports there is often an Air Noise Boundary and an Outer Control Boundary for land use controls outside the airport, but airport noise emissions are only regulated at the Air Noise Boundary. In practice compliance at one boundary results in compliance at others further out. The Proposed Conditions include a single management boundary.
- 9.23 Mr Lloyd's proposed condition YY2 (second instance of that number) sets a vibration limit consistent with my Acoustics Assessment, subject to clarification that it applies to on-site activity and excludes the NIMT. This is now included under Operational Noise and Vibration in the Proposed Conditions.
- 9.24 Mr Lloyd's proposed condition ZZ1 sets a requirement for widespread speculative treatment of houses as I have discussed above. I consider that this requirement needs to apply after detailed design but before noise exposure occurs. In this proposed condition Mr Lloyd appears to take numeric criteria from the district plan and then apply an additional correction for SACs that is not part of those criteria in the district plan.
- 9.25 Mr Lloyd's proposed amendment to Proposed Condition 72(b)(iii) relates to the road surface of the new perimeter road, consistent with my Acoustics Assessment. If specified I recommend the terminology should be to require

³⁰ Evidence of Karen Bell, dated 9 July 2021.

"an asphaltic mix" to maintain noise outcomes but allow for any other engineering requirements. This is now included under Operational Noise and Vibration in the Proposed Conditions.

Stephen Chiles

9 July 2021

APPENDIX A

Project:	Regional Freight Hub	Memo No:	01
Subject:	Noise measurements of shunting activities		
To:	Stephen Chiles, Chiles Ltd		
From:	Michael Smith, Altissimo Consulting Ltd		
Date:	4 June 2021	Reference:	18-133/M01/A

1 Introduction

A sound survey was performed at KiwiRail's Tremaine Avenue depot in Palmerston North on 27 May 2021 to quantify the sound of wagons being shunted together.

2 Survey details

I was accompanied by KiwiRail staff and observed several movements of the shunting loco as part of normal operation. No shunting using mainline locos was observed. Survey details are listed in Table 1.

Table 1 Survey details

Parameter	Value
Operator	Michael Smith
Equipment	NTi XL2-TA Type 1 SLM Serial A2A-17220-E0 calibrated 24/1/20 NTi M2230 Type 1 Microphone Serial A20314 calibrated 25/2/21 Larson Davis CAL200 Type 1 Calibrator Serial 9063 calibrated 21/11/20 Leupold RX-1400i laser range finder
Position	9-18m from source, confirmed with rangefinder Handheld approx. 1.5m above ground and pointed towards source.
Wind	No significant wind

3 Results

The results in terms of the maximum sound level (L_{AFmax}) corrected to a standard distance of 10m are provided in Table 2. The reported level refers to the coupling sound only.

Table 2 Results

Event	L_{AFmax} @ 10m
Shunting loco connecting to train	94 dB
Two half-completed trains being connected (loco not audible)	88 dB
Loco + 2 wagons being connected to train	91 dB
Loco + 1 wagon joining empty train.	93 dB
Shunt connecting to short train	92 dB
Average	92 dB
Standard deviation	2.1 dB

Altissimo Consulting

Based on this information, an updated sound source detail in the format of Table 10 of the acoustics assessment included in the Notice of Requirement is presented in Table 3. The coupling noise makes negligible difference to the noise modelling for the site.

4 Other observations

During the site visit, other sources of noise with notable peaks were observed. In particular, brake noise was observed on a log train starting to drive from rest. I understand that it takes some time from when the driver disengages the brake in the cabin, for sufficient air pressure to develop to fully retract the brake shoes on all wagons (otherwise brakes can generate noise). I also understand there is a pressure indicator, and KiwiRail procedures are for the driver to wait for full pressure before commencing movement.

In addition, it was observed that during marshalling, wagons were being separated without the air pressure systems being manually released via a valve. This was not measured to be significant in terms of total noise emissions, but it is still a noise source that can be reduced through operation in accordance with KiwiRail procedures.

Table 3 Updated noise source detail

Item	Indicative sound levels at 10m	Photograph
<p>Marshalling</p> <p>Noise from a loco approaching, idling, connecting, and departing</p> <p>When coupling wagons together, or a loco to a wagon</p>	<p>75 dB $L_{Aeq(15min)}$</p> <p>92 dB L_{AFmax}</p> <p>93 dB L_{AE}</p>	